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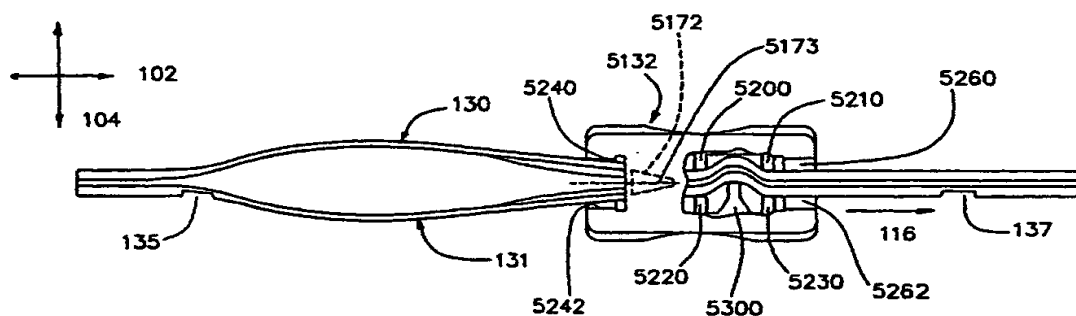
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(54) Title: **CLOSURE DEVICE**



(57) Abstract: The closure device (121) includes a first fastening strip (130), a second fastening strip (131), a slider (132) adapted to be slidably disposed on the fastening strips. The slider (132) facilitates the occlusion of the fastening strips when moved towards a first end thereof. A first detent (137) is located at the first end of the fastening strips. The slider (132) includes a housing having a protrusion (5300) for engaging the first detent (137) of the fastening strips when the slider (132) is moved to the first end of the fastening strips. The protrusion (5300) and detent (137) prevent removal of the slider (132) from the first end of the fastening strips (130, 131) in the longitudinal X axis (102).

CLOSURE DEVICEFIELD OF THE INVENTION

5 The present invention relates generally to closure devices and, more particularly, to a slider, interlocking fastening strips and a method of assembly. The inventive closure devices and method may be employed in traditional fastener areas, and is particularly well suited for
10 fastening flexible storage containers, including plastic bags.

BACKGROUND OF THE INVENTION

15 The use of closure devices for fastening storage containers, including plastic bags, is generally well known. Furthermore, the manufacture of closure devices made of plastic materials is generally known to those skilled in the art, as demonstrated by the numerous patents in this area.

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 A particularly well-known use for closure devices is in connection with flexible storage containers, such as plastic bags. In some instances, the closure device and the associated container are formed from thermoplastic
25 materials, and the closure device and the side walls of the container are integrally formed by extrusion as a single piece. Alternatively, the closure device and side walls of the container may be formed as separate pieces and then connected by heat sealing or any other suitable
30 connecting process. In either event, such closure devices are particularly useful in providing a closure means for retaining matter within the bag.

 Conventional closure devices typically utilize mating
35 fastening strips or closure elements which are used to selectively seal the bag. With such closure devices, however, it is often difficult to determine whether the

fastening strips are fully occluded. This problem is particularly acute when the strips are relatively narrow. Accordingly, when such fastening strips are employed, there exists a reasonable likelihood that the closure device is at least partially open.

Such fastening strips devices are also particularly difficult to handle by individuals with limited manual dexterity. Thus, in order to assist these individuals and for ease of use by individuals with normal dexterity, the prior art has also provided sliders for use in opening and closing the fastening strips, as disclosed, for example, in U.S. Patent Nos. 4,199,845, 5,007,142, 5,007,143, 5,010,627, 5,020,194, 5,070,583, 5,283,932, 5,301,394, 5,426,830, 5,431,760, 5,442,838, and 5,448,808. Some of these sliders include a separator which extends at least partially between the fastening strips. When the slider is moved in the appropriate direction, the separator divides the fastening strips and opens the bag.

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During assembly of closure devices utilizing sliders, the sliders are often mounted onto fastening strips by moving the slider over the fastening strips in the vertical axis. Specifically, if the longitudinal axis of the fastening strips and slider is the X axis, the width is the transverse Y axis and the height is the vertical Z axis, the slider is attached to the fastening strips by moving the slider over the fastening strips in the vertical Z axis. In the past, sliders attached in the vertical Z axis have utilized either a multi-part design or folding design with the hinge along the X axis. In either case the slider must be properly positioned along the fastening strip while the slider components are either snapped or ultrasonically welded together. These procedures increase manufacturing costs. Examples of sliders with multiple parts are disclosed in U.S. Patent Nos. 5,007,142 and 5,283,932 and folding plastic sliders

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in U.S. Patent Nos. 5,067,208, 5,070,583, and 5,448,808. Examples of single piece sliders which are inserted on unoccluded fastening strips are disclosed in U.S. Patents 3,426,396, 3,713,923, 3,806,998 and 4,262,395.

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The prior art has failed to afford a slider that is attached to the fastening strips in the vertical Z axis through a single step process. It would be desirable to have a slider that may be attached to the fastening strips in the vertical Z axis by merely urging the slider over the fastening strips. Such a device would reduce the manufacturing costs of closure devices utilizing sliders in addition to providing an effective and reliable means of attaching sliders to the fastening strips.

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OBJECTS OF THE INVENTION

Accordingly, a general object of the present invention is to provide a slider which overcomes the deficiencies of the prior art.

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A more specific object of the present invention is to provide a one piece slider that may be attached to the fastening strips in the vertical Z axis by merely urging the slider over the fastening strips.

25

A related object of the present invention is to provide a slider that once attached prevents itself from being removed from the fastening strips thereafter.

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SUMMARY OF THE INVENTION

The inventive slider is intended for use with a storage container which includes a pair of complementary sheets or opposing flexible side walls, such as a plastic bag. The closure device includes interlocking fastening strips disposed along respective edge portions of the opposing side walls, and a slider slidably disposed on the interlocking fastening strips for facilitating the

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occlusion and deocclusion of the fastening strips when moved towards first and second ends thereof. In accordance with the present invention, a flexible slider is provided for facilitating the attachment of the slider
5 onto the fastening strips in the vertical Z axis. The slider includes legs which provide resistance against the removal of the slider from the fastening strips in the vertical Z axis thereafter. Additionally, the present invention provides resistance against removal of the
10 slider from the fastening strips in the horizontal X axis.

These and other objects, features, and advantages of the present invention will become more readily apparent upon reading the following detailed description of
15 exemplified embodiments and upon reference to the accompanying drawings herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a container according
20 to the present invention in the form of a plastic bag;

Fig. 2 is a top view of the container in Fig. 1;

Fig. 3 is a partial cross-sectional view of the
25 fastening strips taken along line 3-3 in Fig. 2;

Fig. 4 is another embodiment of attaching the fastening strips;

30 Fig. 5 is a top view of the slider in Fig. 2;

Fig. 6 is a bottom view of the slider in Fig. 2;

Fig. 7 is a front view of the slider in Fig. 2;

35 Fig. 8 is a rear view of the slider in Fig. 2;

Fig. 9 is a cross-sectional view taken along line 9-9 in Fig. 5;

Fig. 10 is a right side view of the slider in Fig. 2;

Fig. 11 is a cross-sectional view taken along line 11-11 in Fig. 5;

Fig. 12 is a cross-sectional view taken along line 12-12 in Fig. 5;

Fig. 13 is a side view of the container in Fig. 1 and illustrates the slider positioned above the fastening strips;

Fig. 14 is a side view of the container in Fig. 1 and illustrates the slider as it is positioned onto the fastening strips;

Fig. 15 is a side view of the container in Fig. 1 and illustrates the slider fully attached to the fastening strips;

Fig. 16 is a cross-sectional view taken along line 16-16 in Fig. 13 and illustrates the slider positioned above the fastening strips;

Fig. 17 is a cross-sectional view taken along line 17-17 in Fig. 14 and illustrates the respective positions of the slider to the fastening strips as the slider is positioned onto the fastening strips;

Fig. 18 is a rear view of the slider and cross-sectional view of the fastening strips and illustrates their respective positions to one another as the slider is positioned onto the fastening strips;

Fig. 19 is an enlarged fragmentary view of the slider and fastening strips in Fig. 18;

Fig. 20 is a cross-sectional view taken along line
5 20-20 in Fig. 15 and illustrates the slider fully attached to the fastening strips;

Fig. 21 is a cross-sectional view taken along line
21-21 in Fig. 15 and illustrates the slider fully attached
10 to the fastening strips;

Fig. 22 is a front view of the separator and cross-sectional view of the fastening strips and illustrates their respective positions to one another as the slider is
15 positioned onto the fastening strips;

Fig. 23 is a front view of the separator and cross-sectional view of the fastening strips and illustrates their respective positions to one another as the slider is
20 positioned onto the fastening strips;

Fig. 24 is a front view of the separator and cross-sectional view of the fastening strips and illustrates their respective positions to one another as the slider is
25 positioned onto the fastening strips;

Fig. 25 is a front view of the separator and cross-sectional view of the fastening strips and illustrates their respective positions to one another as the slider is
30 positioned onto the fastening strips;

Fig. 26 is a cross-sectional view taken along line 26-26 in Fig. 2;

35 Fig. 27 is a cross-sectional view taken along line 27-27 in Fig. 2;

Fig. 28 is a cross-sectional view taken along line 28-28 in Fig. 2;

Fig. 29 is a partial top view of the slider located
5 near the end of the fastening strips;

Fig. 30 is a cross-sectional view taken along line 30-30 in Fig. 29;

10 Fig. 31 is a cross-sectional view of another embodiment of the slider and fastening strips;

Fig. 32 is a top view of another embodiment of the slider and fastening strips;

15 Fig. 33 is a top view of another embodiment of a slider;

Fig. 34 is a bottom view of the slider of Fig. 33;

20 Fig. 35 is a front view of the slider in Fig. 33;

Fig. 36 is a rear view of the slider in Fig. 33;

25 Fig. 37 is a side view of the slider in Fig. 33;

Fig. 38 is a cross-sectional view illustrating the slider being positioned on the fastening strips;

30 Fig. 39 is a cross-sectional view illustrating the slider being positioned on the fastening strips;

Fig. 40 is a cross-sectional view illustrating the slider being positioned on the fastening strips;

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Fig. 41 is a cross-sectional view of the closing end illustrating the slider fully attached to the fastening strips;

5 Fig. 42 is a cross-sectional view of the opening end illustrating the slider fully attached to the fastening strips;

10 Fig. 43 is view of the separator and fastening strips and illustrates their positions to one another as the slider is positioned onto the fastening strips;

15 Fig. 44 is view of the separator and fastening strips and illustrates their positions to one another as the slider is positioned onto the fastening strips;

20 Fig. 45 is view of the separator and fastening strips and illustrates their positions to one another as the slider is positioned onto the fastening strips;

Fig. 46 is view of the separator and fastening strips and illustrates their positions to one another as the slider is positioned onto the fastening strips;

25 Fig. 47 is a top view of the slider in Fig. 33 and a partial view of the fastening strips;

30 Fig. 48 is a cross-sectional view taken along line 48-48 in Fig. 47;

Fig. 49 is a cross-sectional view taken along line 49-49 in Fig. 47;

35 Fig. 50 is a cross-sectional view taken along line 50-50 in Fig. 47;

Fig. 51 is a top view of another embodiment of a slider;

Fig. 52 is a bottom view of the slider in Fig. 51;

Fig. 53 is an end view of the slider in Fig. 51;

Fig. 54 is a side view of the slider in Fig. 51;

Fig. 55 is a top view of the slider in Fig. 51 and a partial view of the fastening strips;

Fig. 56 is a cross-sectional view taken along line 56-56 in Fig. 55;

Fig. 57 is a cross-sectional view taken along line 57-57 in Fig. 55.

Fig. 58 is a cross-sectional view taken along line 58-58 in Fig. 55;

Fig. 59 is a cross-sectional view taken along line 59-59 in Fig. 55;

Fig. 60 is a cross-sectional view taken along line 60-60 in Fig. 55;

Fig. 61 is a cross-sectional view taken along line 61-61 in Fig. 55;

Fig. 62 is a rear view of another embodiment of the slider;

Fig. 63 is a rear view of another embodiment of the slider and cross-sectional view of the fastening strips and illustrates the slider positioned above the fastening strips;

Fig. 64 is a rear view of the slider in Fig. 63 and cross-sectional view of the fastening strips and illustrates the slider as it is positioned onto the
5 fastening strips;

Fig. 65 is a rear view of the slider in Fig. 63 and cross-sectional view of the fastening strips and illustrates the slider fully attached to the fastening
10 strips;

Fig. 66 is a rear view of another embodiment of the slider and the fastening strips;

15 Fig. 67 is a rear view of another embodiment of the slider and cross-sectional view of the fastening strips and illustrates the slider positioned above the fastening strips;

20 Fig. 68 is a rear view of the slider in Fig. 67 and cross-sectional view of the fastening strips and illustrates the slider fully attached to the fastening strips;

25 Fig. 69 is a top view of the slider attached to the fastening strips;

Fig. 70 is a top view of the slider attached to and engaged with a detent of the fastening strips;
30

Fig. 71 is a bottom view of another embodiment of the slider;

Fig. 72 is a partial cut away top view of another
35 embodiment of the slider attached to the fastening strips;

Fig. 73 is a partial cut away top view of the slider in Fig. 72 attached to and engaged with a detent of the fastening strips;

5 Fig. 74 is a top view of another embodiment of a slider;

Fig. 75 is a bottom view of the slider in Fig. 74;

10 Fig. 76 is a front view of the slider in Fig. 74;

Fig. 77 is a rear view of the slider in Fig. 74;

15 Fig. 78 is a top view of the slider in Fig. 74 and a partial view of the fastening strips;

Fig. 79 is a top view of the slider and fastening strips in Fig. 78 with the slider engaging a detent in the fastening strips;

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Fig. 80 is a rear view of another embodiment of the slider and a cross-sectional view of another embodiment of the fastening strips;

25 Fig. 81 is a rear view of another embodiment of the slider and a cross-sectional view of another embodiment of the fastening strips; and

30 Fig. 82 is a rear view of another embodiment of the slider and a cross-sectional view of another embodiment of the fastening strips.

35 While the present invention will be described and disclosed in connection with certain embodiments and procedures, the intent is not to limit the present invention to these embodiments and procedures. On the contrary, the intent is to cover all such alternatives,

modifications, and equivalents that fall within the spirit and scope of the present invention as defined by the appended claims.

5 DESCRIPTION OF THE EMBODIMENTS

 Figs. 1 and 2 illustrate a container in the form of a plastic bag 120 having a sealable closure device 121. The bag 120 includes side walls 122, 123 joined at seams 125, 126 to form a compartment sealable by means of the closure device 121. The closure device 121 comprises first and second fastening strips 130, 131 and a slider 132. The closure device 121 also includes first and second detents 135, 137 along the outside of the fastening strips 130, 131.

15 The fastening strips 130, 131 and the slider 132 have a longitudinal X axis 102 and a transverse Y axis 104 which is perpendicular to the longitudinal X axis 102. Also, the fastening strips have a vertical Z axis 106 which is perpendicular to the longitudinal X axis 102 and which is perpendicular to the transverse Y axis 104.

 In use, the slider 132 of the present invention facilitates the occlusion and deocclusion of the interlocking fastening strips 130, 131 when moved in the appropriate direction along the longitudinal X axis 102 of the fastening strips 130, 131. In particular, the slider 132 facilitates the occlusion of the interlocking fastening strips 130, 131 when moved towards a first end 110 thereof, and facilitates the deocclusion of the interlocking fastening strips 130, 131 when moved towards a second end 112 thereof. When the slider 132 is moved in an occlusion direction, as indicated by reference numeral 114 in Figs. 1 and 2, closure of the fastening strips 130, 131 occurs. Conversely, when the slider 132 is moved in a deocclusion direction, as indicated by

reference numeral 116, separation of the fastening strips 130, 131 occurs.

In keeping with a general aspect of the present invention and as will be described in greater detail below, the interlocking fastening strips 130, 131 of the present invention may be of virtually any type or form including, for example: (1) U-channel fastening strips as best shown herein at Figs. 3 and 4; (2) arrowhead-type fastening strips, as disclosed in U.S. Patent Nos. 5,007,142 and 5,020,194, and as shown herein at Fig. 80; (3) profile fastening strips, as disclosed in U.S. Patent No. 5,664,299 and as shown herein at Fig. 81; and/or (4) rolling action fastening strips as disclosed in U.S. Patent 5,007,143 and as shown herein at Fig. 82. All of the above-identified patents and applications are hereby incorporated by reference in their entireties.

An illustrative example of the type of closure device that may be used with the present invention is shown in Fig. 3. The fastening strips include a first fastening strip 130 with a first closure element 136 and a second fastening strip 131 with a second closure element 134. The first closure element 136 engages the second closure element 134. The first fastening strip 130 may include a flange 163 disposed at the upper end of the first fastening strip 130 and an outer offset 167 and an inner offset 169, each disposed at the lower end of the first fastening strip 130. Likewise, the second fastening strip 131 may include a flange 153 disposed at the upper end of the second fastening strip 131 and an outer offset 157 and an inner offset 159, each disposed at the lower end of the second fastening strip 131. The flanges 163, 153 include a straight portion 166, 156 and an angled portion 168, 158. The angled portion 168, 158 is at an approximately 120 degree angle to the straight portion 166, 156. The side walls 122, 123 of the plastic bag 120 may be attached

to the inner offsets 159, 169 of their respective fastening strips 130, 131 by conventional manufacturing techniques. As shown in Fig. 4, the side walls 122, 123 of the bag 120 may also be attached to the outside
5 surfaces of their respective fastening strips 130, 131, where the outside surfaces comprise the outer offsets 157, 167 and the base portions 138, 148

The second closure element 134 includes a base
10 portion 138 having a pair of spaced-apart parallelly disposed webs 140, 141, extending from the base portion 138. The webs 140, 141 include hook closure portions 142, 144 extending from the webs 140, 141 respectively, and facing towards each other. The hook closure portions 142,
15 144 include guide surfaces 146, 147 which serve to guide the hook closure portions 142, 144 for occluding with the hook closure portions 152, 154 of the first closure element 136.

The first closure element 136 includes a base portion
20 148 including a pair of spaced-apart, parallelly disposed webs 150, 151 extending from the base portion 148. The webs 150, 151 include hook closure portions 152, 154 extending from the webs 150, 151 respectively and facing
25 away from each other. The hook closure portions 152, 154 include guide surfaces 145, 155, which generally serve to guide the hook closure portions 152, 154 for occlusion with the hook closure portions 142, 144 of the second closure element 134. The guide surfaces 145, 155 may also
30 have a rounded crown surface. In addition, the hook closure portions 144, 154 may be designed so that the hook closure portions 144, 154 adjacent the interior of the container provide a greater resistance to opening the closure device 121.

The second fastening strip 131 may or may not include a color enhancement member 135 which is described in U.S. Patent 4,829,641 and which is incorporated by reference.

5 Referring to Figs. 5-12, the slider 132 includes a housing 160 and an attaching means 162. The housing 160 may include a top portion 170, a first side portion 174, and a second side portion 176. The top portion 170 provides a separator 172 having a first end 190 and a
10 second end 192 where the first end 190 is wider than the second end 192. The separator 172 also angles downwardly from the first end 190 to the second end 192 as illustrated in Figs. 11 and 12. The separator 172 is triangular in shape as shown in Fig. 6.

15 Referring to Figs. 7 and 8, the separator 172 has a first surface 180 at the first end 190 and a second surface 181 at the second end 192. The separator 172 has a bottom surface 182. In this embodiment, the bottom
20 surface 182 angles downwardly from the first end 190 to the second end 192 as shown in Figs 7, 11 and 12. In addition, the bottom surface 182 angles inwardly from the first end 190 to the second end 192 as shown in Fig. 6. Also, the separator 172 has a first side wall 183 and a
25 second side wall 184 as shown in Figs. 6-8. The side walls 183, 184 angle inwardly from the first end 190 to the second end 192. The side walls 183, 184 also angle outwardly from the bottom to the top as shown in Figs. 7 and 8.

30 The top portion 170 of the slider merges into a first side portion 174 and a second side portion 176. The first side portion 174 has a first grip 196 and a rigid occlusion member 200. Similarly, the second side portion
35 176 has a second grip 198 and a flexible occlusion member 220. The first grip 196 and the second grip 198 extend laterally along the outer surfaces of the side portions

174, 176 and provide inwardly protruding radial gripping surfaces 206, 208 designed to correspond to the contour of a person's fingertips as viewed in Figs. 5 and 6. The radial surfaces 206, 208 facilitate grasping the slider 132 during occlusion or deocclusion of the fastening strips 130, 131.

The occlusion members 200, 210 oppose one another and force the fastening strips 130, 131 together to effectuate occlusion of the fastening strips 130, 131 when the slider is moved in the occlusion direction 114. A bridge 220 perpendicularly disposed between the side portions 174, 176 provides reinforcement between the occlusion members 200, 210 to prevent the side portions 174, 176 from flexing during use. As viewed in Figs. 5 and 6, the rigid occluding member 200 has inner surfaces 202, 204 which angle outwardly thus forming a V-shape. The flexible occlusion member 210 includes a spine 212 and a pair of flexible arms 214, 216. The two flexible arms 214, 216 are attached to and angle inwardly toward the spine 212 thereby forming a V-shape as viewed in Figs. 5 and 6. The respective V-shapes of the occlusion members 200, 210 facilitate insertion of the fastening strips 130, 131 between the occlusion members 200, 210 by minimizing the surface area resisting insertion of the fastening strips 130, 131 into the slider 132. The flexible occlusion member 210 also permits the use of fastening strips of different and/or varying widths. Specifically, the flexible occlusion member can flex to accommodate fastening strips of different and/or varying widths, but can also exert sufficient force to occlude the fastening strips.

As viewed in Figs. 5-9, the inner surfaces 202, 204 of the rigid occlusion member 200 taper outwardly in the transverse Y axis 104, ultimately merging into the first side portion 174. Similarly, the arms 214, 216 of the

flexible occlusion member 210 also taper outwardly in the transverse Y axis 104. The tapered surfaces of the occlusion members 200, 210 serve to guide the fastening strips 130, 131 between the occluding members 200, 210 during attachment of the slider 132 onto the fastening strips 130, 131.

The attaching means 162 includes a pair of front flexible shoulders 230, 232, a pair of front legs 240, 242, a pair of rear flexible shoulders 250, 252, and a pair of rear legs 260, 262. As viewed in Fig. 7, the first side portion 174 merges into the first front leg 240 through the first front shoulder 230. Likewise, the second side portion 176 merges into the second front leg 242 through the second front shoulder 232. The front legs 240, 242 angle inwardly in the transverse Y axis 104 thereby forming a front slot 270 of substantially uniform width as seen in Figs. 5 and 6.

Similarly, as viewed in Fig. 8, the first side portion 174 merges into the first rear leg 260 through the first rear shoulder 250. Also, the second side portion 176 merges into the second rear leg 262 through the second rear shoulder 252. The rear legs 260, 262 angle inwardly in the transverse Y axis 104 thus forming a rear slot 280 of substantially uniform width. In a relaxed state, the legs 240, 242, 260, 262 of the slider 132 angle inwardly away from their respective side portions 174, 176 to form a void volume through which the legs 240, 242, 260, 262 may move outwardly in the transverse Y axis 104 during attachment of the slider 132 onto the fastening strips 130 131.

In accordance with an aspect of the present invention, a flexible slider 132 is provided to attach the slider 132 to the fastening strips 130, 131 in the vertical Z axis 106 while preventing the slider 132 from

being removed from the fastening strips 130, 131 in the vertical Z axis 106 thereafter. It will be appreciated by those skilled in the art that the slider 132 may be molded from any suitable plastic material.

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Figs. 13-15 sequentially illustrate the attachment of a slider 132 made in accordance with the present invention onto the fastening strips 130, 131 of a plastic bag 120 in the vertical Z axis 106. Fig. 13 represents the slider 132 positioned directly over the fastening strips 130, 131. Fig. 14 illustrates the slider as it is moved downwardly in the vertical Z axis 106 and positioned onto the fastening strips 130, 131. Fig. 15 shows the slider 132 as it is moved further in the vertical Z axis 106 and represents the slider 132 fully attached to the fastening strips 130, 131 of the plastic bag 120.

Figs. 16-19 sequentially illustrate the attachment of the slider 132 onto the fastening strips 130, 131 in the vertical Z axis 106. Although the following description will be limited to the slider components illustrated in the respective view described, it will be appreciated that the other slider components will function in a similar fashion. For example, the front legs 240, 242 of the slider 132 will operate in the same fashion as the rear legs 260, 262 of the slider 132 during attachment of the slider 132 onto the fastening strips 130, 131.

Fig. 16 depicts occluded fastening strips 130, 131 and a slider 132 having first and second rear legs 260, 262 in a relaxed position. The occluded fastening strips 130, 131 are immediately below the rear slot 280. Referring to Fig. 17, the slider 132 is moved in the vertical Z axis 106 toward the fastening strips 130, 131. The fastening strips 130, 131 engage the rear legs 260, 262 and deflect the legs 260, 262 outwardly in the transverse Y axis 104 toward their respective side

portions 174, 176 thus widening the rear slot 280. The fastening strips 130, 131 are guided into the slider 132 by the tapered surfaces of the occlusion members 200, 210.

5 Fig. 18 illustrates the fastening strips 130, 131 moving through the rear slot 280. The separator 172 begins to penetrate between the flanges 153, 163 of the fastening strips 130, 131. In this position, the second end 192 of the separator 172 has penetrated between the
10 fastening strips 130, 131, whereas the first end 190 of the separator 172 is still positioned above the fastening strips 130, 131 as illustrated in Fig. 19. This effect is achieved by the separator 172 design which, as stated above, angles downwardly from the first end 190 to the
15 second end 192. As such, the second end 192 of the separator 172 serves to initially penetrate the occluded fastening strips 130, 131 and positions the separator 172 between the fastening strips 130, 131 before full attachment is achieved.

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As shown in Fig. 20, upon further movement of the fastening strips 130, 131 toward the slider 132 in the vertical Z axis 106, the fastening strips 130, 131 project through the legs 260, 262, and the legs 260, 262 retract
25 back to their relaxed position. Likewise, the width of the rear slot 280 returns to its relaxed position width. With respect to the fastening strips 130, 131, the separator 172 is forced between the flanges 153, 163 of the occluded fastening strips 130, 131. The first end 190
30 of the separator 172, the wider end, is forced between and effectively deoccludes the fastening strips 130, 131 as illustrated in Fig. 21. The penetration and deocclusion is discussed more fully with respect to Figs. 22-25.

35 Figs. 20 and 21 represent the attached position of the slider 132 on fastening strips 130, 131. As illustrated in Fig. 20, once the legs 260, 262 return to

their relaxed position, the fastening strips 130, 131 no longer fit through the slot 280. As an aspect of the present invention, the legs 260, 262 effectuate attachment of the slider 132 onto the fastening strips 130, 131 in the vertical Z axis 106 while preventing removal of the slider 132 from the fastening strips 130, 131 in the vertical Z axis 106 after the slider 132 has been attached to the fastening strips 130, 131. In the event removal of the slider 132 in the vertical Z axis 106 is attempted, the legs 260, 262 will provide resistance against removal of the slider 132. The legs 260, 262 retain the slider 132 on the fastening strips 130, 131 by resisting vertical Z axis 106 movement of the fastening strips 130, 131 through the slot 280. More specifically, the legs 260, 262 are angled upwardly and inwardly so that during insertion of the slider 132 onto the fastening strips 130, 131 the legs 260, 262 deflect outwardly in the transverse Y axis 104 to increase the width of the slot 280 and permit the passage of the fastening strips 130, 131. When attempting to remove the slider 132 from the fastening strips 130, 131 in the vertical Z axis 106, the outer offsets 157, 167 of the fastening strips 130, 131 contact the legs 260, 262 and deflect the legs 260, 262 inwardly in the transverse Y axis 104. Thus, the width of the slot 280 is reduced until the legs 260, 262 are ultimately forced against one another. The rigidity of the legs 260, 262 and shoulders 250, 252 will resist inward movement of the legs 260, 262 beyond the point where the legs 260, 262 engage one another. As a result, the slider 132 may only be removed from the fastening strips 130, 131 in the vertical Z axis 106 by either tearing through the fastening strips 130, 131 or breaking and/or by deforming the legs 260, 262 of the slider 132.

Figs. 22-25 sequentially illustrate the first end 190, the wider end, of the separator 172 penetrating the occluded fastening strips 130, 131 during attachment of

the slider 132 onto the fastening strips 130, 131 in the vertical Z axis 106. Fig. 22 depicts the separator 172 immediately above the occluded fastening strips 130, 131 in a position prior to penetration by the separator 172.

5 Referring to Fig. 23, the separator 172 is moved downwardly in the vertical Z axis 106 and forced between the flanges 153, 163 of the fastening strips 130, 131. The fastening strips 130, 131 are forced apart in the transverse Y axis 104 and the upper webs 140, 150 of the
10 fastening strips 130, 131 are effectively deoccluded. As the separator 172 penetrates further between the flanges 153, 163 of the fastening strips 130, 131, the lower webs 141, 151 of the fastening strips 130, 131 also begin to deocclude as illustrated in Fig. 24. Fig. 25 shows the
15 separator 172 once it has fully penetrated the fastening strips 130, 131. At this position both the upper webs 140, 141 and the lower webs 150, 151 of the fastening strips 130, 131 are deoccluded and attachment of the slider 172 to the fastening strips 130, 131 is complete.
20 The flanges 153, 163 of the fastening strips 130, 131 are the only separator 172 engaging surfaces of the fastening strips 130, 131. As such, the slider 132 need not force itself between the webs 140, 141, 150, 151 of the fastening strips 130, 131.

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Figs. 26-28 illustrate the fastening strips 130, 131 at different locations along the separator 172 of the slider 132 as shown in Fig. 2. Fig. 26 depicts the fastening strips 130, 131 at a location near the second
30 end 192 (the narrow end) of the separator 172. The separator 172 is located between the flanges 153, 163 of the fastening strips 130, 131. At this location, the upper webs 140, 150 and the lower webs 141, 151 are occluded. Fig. 27 illustrates the fastenings strips 130,
35 131 at a location near the middle of the separator 172. The width of the separator 172 at this location forces the fastening strips 130, 131 apart in the transverse Y axis

104 and the upper webs 140, 150 of the fastening strips 130, 131 are effectively deoccluded. Fig. 28 shows the fastening strips 130, 131 near the first end 190 (the wide end) of the separator 172. At this position, the width of
5 the separator 172 deoccludes both the upper webs 140, 150 and the lower webs 141, 151 of the fastening strips 130, 131. The flanges 153, 163 of the fastening strips 130, 131 are the only separator 172 engaging surfaces of the fastening strips 130, 131. Consequently, the slider 132
10 need not force itself between the webs 140, 141, 150, 151 of the fastening strips 130, 131.

The angled portions 168, 158 of the flanges facilitate the deocclusion of the fastening strips and
15 allows the use of a narrower separator 172. Specifically, the angled portions contact the separator 172 to deocclude the fastening strips 130, 131. Because the angled portions 168, 158 extend inwardly to engage the separator 172, the separator can have a width 171 to achieve
20 deocclusion of the fastening strips. If the angled portions were not used and the separator contacted only the straight portions, then the separator would need to have a width greater than width 171 in order to achieve deocclusion, assuming all other dimensions and parameters
25 are the same.

Fig. 29 shows the slider 132 in the end position of the fastening strips 130, 131 near the seam 125. Fig. 30 illustrates occlusion of the fastening strips in the end
30 position. In accordance with one feature of the invention, these figures demonstrate that the closure device will have a leak proof seal when the slider is in the end position. The leak proof seal is created even though the separator finger extends between the flanges
35 153, 163. The positions of the fastening strips are effected not only by the forces acting upon them by the slider at a particular location but are also effected by

the position of the fastening strips at locations before and after that particular location. Specifically, with respect to the position of the inner closure portions 141, 151 in Fig. 30, the position of the inner closure portions 141, 151 is effected by the seam 125 at the end of the fastening strips. At the seam 125, the fastening strips 130, 131 are melted together which effectively occludes the fastening strips. This occlusion of the fastening strips 130, 131 at the seam 125 prevents separating action of the separator finger 172 from deoccluding the inner closure portions 141, 151. Thus, the inner closure portions 141, 151 remain occluded even though the separator finger 172 is attempting to deocclude the inner closure portions. Consequently, the inner closure portions 141, 151 remain occluded through the length of the fastening strips and establish a leak proof seal through the length of the fastening strips when fully occluded.

For example, as the user moves the slider 132 in the occlusion direction, the slider would deocclude the fastening strips 130, 131 in the sequence shown in Figs. 26-28. When the slider is in the location shown in Fig. 28, the inner closure portions 141, 151 of the fastening strips would usually be deoccluded as shown in Fig. 28. Referring to Fig. 29, the slider is prevented from further movement in the occlusion direction when the latch contacts the notch. However, as noted above, the seam 125 causes the inner closure portions 141, 151 to be occluded at the location in Fig. 30 even when the slider is not present. Therefore, when the slider moves to the locations shown in Figs. 29 and 30, the inner closure portions 141, 151 are already occluded and the separating action of the separating finger 172 is not able to overcome the occlusion effect of the seam 125. Thus, the inner closure portions 141, 151 remain occluded through

the length of the fastening strips and establish a leak proof seal.

Fig. 31 illustrates another embodiment of a slider 5 332 and fastening strips 330, 331. The fastening strips 330, 331 include flanges 363, 353 which include a straight portion 366, 356 and an angled portion 368, 358. The angled portion 368, 358 is at an approximately 90 degree angle to the straight portion 366, 356. The angled 10 portion 368, 358 facilitates the deocclusion of the fastening strips and allows the use of a narrower separator 372. Specifically, the angled portions contact the separator 372 to deocclude the fastening strips 330, 331. Because the angled portions 368, 358 extend inwardly 15 to engage the separator 372, the separator can have a width 371 to achieve deocclusion of the fastening strips. If the angled portions were not used and the separator contacted only the straight portions, then the separator would need to have a width greater than width 371 in order 20 to achieve deocclusion, assuming all other dimensions and parameters are the same.

The fastening strips 330, 331 also include protrusions 446, 456. The protrusions 466, 456 are 25 located near the bottom of the fastening strips 330, 331. The shoulders 340, 342 engage the protrusions 466, 456 to hold the fastening strips 330, 331 within the slider 332.

Fig. 32 illustrates another embodiment of a slider 30 532 and fastening strips 530, 531. The slider 532 has occlusion members 600, 610. The occlusion members 600, 610 extend inward from the side walls of the slider towards the center of the slider. The occlusion members 600, 610 occlude the fastening strips 530, 531 similar to 35 occlusion members 200, 210 in Fig. 5. However, occlusion members 600, 610 are rigid occlusion members.

Figs. 33-37 illustrate another embodiment of a slider 732. The slider 732 has another embodiment of a separator 772. The separator 772 has a different configuration than the separator 172 shown in Fig. 6. In addition, the
5 separator 772 is wider than the separator 172 shown in Fig. 6. The separator 772 has a first end 790 and a second end 792. In this embodiment, the first end 790 is wider than the second end 792 as shown in Fig. 34. The separator has a first surface 780 at the first end 790 and
10 a second surface 781 at the second end 792. The separator has a bottom surface 782. In this embodiment, the bottom surface 782 is a raised ridge with a horizontal surface 785 and side surfaces 786, 787. The separator also has a first side wall 783 and a second side wall 784. The side
15 walls 783, 784 angle inwardly and upwardly from the first end 790 to the second end 792. The side walls 783, 784 extend to the first side portion 774 and to the second side portion 776. In addition, the separator has rigid occlusion members 800, 810 as described with respect to
20 Fig. 32.

Figs. 38-41 sequentially illustrate the attachment of the slider 732 onto the fastening strips 130, 131 in the vertical Z axis 106. Although the following description
25 will be limited to the slider components illustrated in the respective view described, it will be appreciated that the other slider components will function in a similar fashion. For example, the front legs 840, 842 of the slider 732 will operate in the same fashion as the rear
30 legs 860, 862 of the slider 732 during attachment of the slider 732 onto the fastening strips 130, 131.

Referring to Fig. 38, the slider 732 is moved in the vertical Z axis 106 toward the fastening strips 130, 131.
35 The fastening strips 130, 131 engage the rear legs 860, 862 and deflect the legs 860, 862 outwardly in the transverse Y axis 104 toward their respective side

portions 774, 776 thus widening the rear slot 880. The fastening strips 130, 131 are guided into the slider 732 by the tapered surfaces of the legs 860, 862.

5 Figs. 39 and 40 illustrate the fastening strips 130, 131 moving through the rear slot 880. The separator 772 begins to penetrate between the flanges 153, 163 of the fastening strips 130, 131. The bottom surface 782 of the separator 772 has penetrated between the fastening strips
10 130, 131. This effect is achieved by the ridge 172 which serves to initially penetrate the occluded fastening strips 130, 131 and positions the separator 772 between the fastening strips 130, 131 before full attachment is achieved.

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As shown in Fig. 41, upon further movement of the fastening strips 130, 131 toward the slider 732 in the vertical Z axis 106, the fastening strips 130, 131 project through the legs 860, 862, and the legs 860, 862 retract
20 back to their relaxed position. Likewise, the width of the rear slot 880 returns to its relaxed position width. With respect to the fastening strips 130, 131, the separator 772 is forced between the flanges 153, 163 of the occluded fastening strips 130, 131. The first end 790
25 of the separator 772, the wider end, is forced between and effectively deoccludes the fastening strips 130, 131 as illustrated in Fig 42. The penetration and deocclusion is discussed more fully with respect to Figs. 43-46.

30 Figs. 41 and 42 represent the attached position of the slider 732 on fastening strips 130, 131. As illustrated in Fig. 41, once the legs 260, 262 return to their relaxed position, the fastening strips 130, 131 no longer fit through the slot 880. As an aspect of the
35 present invention, the legs 860, 862 effectuate attachment of the slider 732 onto the fastening strips 130, 131 in the vertical Z axis 106 while preventing removal of the

slider 732 from the fastening strips 130, 131 in the vertical Z axis 106 after the slider 732 has been attached to the fastening strips 130, 131. In the event removal of the slider 732 in the vertical Z axis 106 is attempted, 5 the legs 860, 862 will provide resistance against removal of the slider 732. The legs 860, 862 retain the slider 732 on the fastening strips 130, 131 by resisting vertical Z axis 106 movement of the fastening strips 130, 131 through the slot 880.

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More specifically, the legs 860, 862 are angled upwardly and inwardly so that during insertion of the slider 732 onto the fastening strips 130, 131 the legs 860, 862 deflect outwardly in the transverse Y axis 104 to 15 increase the width of the slot 880 and permit the passage of the fastening strips 130, 131. When attempting to remove the slider 732 from the fastening strips 130, 131 in the vertical Z axis 106, the protrusions 866, 856 of the fastening strips 130, 131 contact the legs 860, 862 20 and deflect the legs 860, 862 inwardly in the transverse Y axis 104. Thus, the width of the slot 880 is reduced until the legs 860, 862 are ultimately forced against one another. The rigidity of the legs 860, 862 and shoulders will resist inward movement of the legs 860, 862 beyond 25 the point where the legs 860, 862 engage one another. As a result, the slider 732 may only be removed from the fastening strips 130, 131 in the vertical Z axis 106 by either tearing through the fastening strips 130, 131 or breaking and/or by deforming the legs 860, 862 of the 30 slider 732.

Figs. 43-46 sequentially illustrate the first end 790, the wider end, of the separator 772 penetrating the occluded fastening strips 130, 131 during attachment of 35 the slider 732 onto the fastening strips 130, 131 in the vertical Z axis 106. Fig. 43 depicts the separator 772 immediately above the occluded fastening strips 130, 131

in a position prior to penetration by the separator 772. Referring to Fig. 44, the separator 772 is moved downwardly in the vertical Z axis 106 and forced between the flanges 153, 163 of the fastening strips 130, 131. The fastening strips 130, 131 are forced apart in the transverse Y axis 104 and the upper webs 140, 150 of the fastening strips 130, 131 are deoccluded. As the separator 772 penetrates further between the flanges 153, 163 of the fastening strips 130, 131, the lower webs 141, 151 of the fastening strips 130, 131 also begin to deocclude as illustrated in Fig. 45. Fig. 46 shows the separator 772 once it has fully penetrated the fastening strips 130, 131. At this position both the upper webs 140, 141 and the lower webs 150, 151 of the fastening strips 130, 131 are deoccluded and attachment of the slider 772 to the fastening strips 130, 131 is complete. The flanges 153, 163 of the fastening strips 130, 131 are the only separator 772 engaging surfaces of the fastening strips 130, 131. As such, the slider 732 need not force itself between the webs 140, 141, 150, 151 of the fastening strips 130, 131.

Figs. 48-50 illustrate the fastening strips 130, 131 at different locations along the separator 772 of the slider 732 as shown in Fig. 47. Fig. 48 depicts the fastening strips 130, 131 at a location near the second end 192 (the narrow end) of the separator 772. The separator 172 is located between the flanges 153, 163 of the fastening strips 130, 131. At this location, the upper webs 140, 150 and the lower webs 141, 151 are occluded. Fig. 49 illustrates the fastenings strips 130, 131 at a location near the middle of the separator 772. The width of the separator 772 at this location forces the fastening strips 130, 131 apart in the transverse Y axis 104 and the upper webs 140, 150 of the fastening strips 130, 131 are deoccluded. Fig. 50 shows the fastening strips 130, 131 near the first end 190 (the wide end) of

the separator 772. At this position, the width of the separator 772 deoccludes both the upper webs 140, 150 and the lower webs 141, 151 of the fastening strips 130, 131. The flanges 153, 163 of the fastening strips 130, 131 are the only separator 772 engaging surfaces of the fastening strips 130, 131. Consequently, the slider 732 need not force itself between the webs 140, 141, 150, 151 of the fastening strips 130, 131.

10 Figs. 51-54 illustrate another embodiment of a slider 932. The slider 932 has another embodiment of a separator 972. The separator 972 has a first end 990 and a second end 992. In this embodiment, the first end 990 is wider than the second end 992 as shown in Fig. 52. The
15 separator has a first surface 980 at the first end 990 and a second surface 981 at the second end 992. The separator has a bottom surface 982. In this embodiment, the bottom surface 982 includes a raised ridge with a horizontal surface 985 and side surfaces 986, 987. The bottom
20 surface 982 also includes angled surfaces 988, 989 which angle inwardly from the first end 990 to the second end 992 as shown in Fig. 54. Furthermore, the angled surfaces 988, 989 angle downwardly relative to the vertical Z axis from the outer edges at the side walls 983, 984 toward the
25 middle of the separator as shown in Fig. 53. Also, the separator 972 has a first side wall 983 and a second side wall 984 as shown in Figs. 52-54. The side walls 983, 984 angle inwardly from the first end 990 to the second end 992 as shown in Fig. 52. The side walls 983, 984 also
30 angle outwardly from the bottom to the top as shown in Fig. 53.

In this embodiment, the slider 932 has relatively rigid legs or shoulders similar to the embodiments shown
35 in Figs. 63-66. The slider 932 attaches to the fastening strips similar to those sliders as noted below. In another embodiment, the slider may have flexible legs or

shoulders and would attach to the fastening strips similar to sliders noted above.

Figs. 56-59 illustrate the fastening strips 130, 131 at different locations along the slider 932 as shown in Fig. 55. The fastening strips 130, 131 occlude and deocclude similar to the embodiments noted above. However, this embodiment includes shear wings 993, 994 as shown in Figs. 52, 53, 54 and 59. During the manufacture of the fastening strips, certain lengths of the fastening strips may be improperly formed. For example, the webs 141, 151 may be angled downward, as opposed to the normal position, for a portion along the length of the fastening strips. This malformation of the webs 141, 151 may make the disengagement of the webs 141, 151 more difficult than for normally formed webs 141, 151. The shear wings 993, 994 are used to assist the disengagement of the improperly formed webs.

Specifically, when the properly formed webs 141, 151 are near the location shown in Fig. 58, the webs 141, 151 are usually disengaged. However, when improperly formed webs 141, 151 are near the location shown in Fig. 58, the webs 141, 151 may not be disengaged. In order to assist the disengagement of the improperly formed webs, the shear wings 993, 994 cause the fastening strips to shear in the vertical axis 106 as shown in Fig. 59. The deflection of the webs and hooks in conjunction with the shearing action causes the improperly formed webs 141, 151 to disengage.

Referring to Fig. 59, the shearing action occurs when the fastening strip 130 engages the shoulder 1042 on the slider 932. The shoulder 1042 is at a different height than the shoulder 1040 as shown in Fig. 60. Specifically, the shoulder 1042 is higher than the shoulder 1040. When the fastening strip 130 engages the shoulder 1042, the fastening strip 130 is moved upward in the vertical Z axis

106 relative to the fastening strip 130. The fastening strip 130 moves upward until the protrusion 1066 engages the shear wing 994. In addition, the shear wing 993 engages the protrusion 1056 and holds the fastening strip 5 131 to prevent the fastening strip 131 from moving in the upward direction as shown in Figs. 59 and 60. The shearing movement among the fastenings trips 130, 131, in conjunction with the deflection of the webs and hooks, causes the improperly formed webs 141, 151 to disengage as 10 shown in Fig. 59.

In another embodiment, the fastening strip 131 could be moved downward relative to the fastening strip 130. In this other embodiment, the shearing action occurs when the 15 shear wing 993 engages the protrusion 1056 on the fastening strip 131. When the shear wing 993 engages the protrusion 1056, the fastening strip 131 is moved downward in the vertical Z axis 106 relative to the fastening strip 130. In addition, the shoulder 1042 holds the fastening 20 strip 130 to prevent the fastening strip 130 from moving in the downward direction. The shoulder 1042 is at a different height than the shoulder 1040. In this other embodiment, the shoulder 1042 is higher than the shoulder 1040. The shearing movement among the fastening strips 25 130, 131, in conjunction with the deflection of the webs and hooks, causes the improperly formed webs 141, 151 to disengage.

The resistance which the flexible shoulders and legs 30 provide during attachment onto and removal from the fastening strips may be affected by varying the dimensions and/or material composition of the slider design. For instance, Fig. 62 depicts another embodiment of a slider 1132 made in accordance with the present invention. This 35 embodiment is similar to the embodiment illustrated in Fig. 8 except that the legs 1260, 1262 of the slider 1132 have a different configuration. Specifically, the legs

1260, 1262 have a varied leg width that increases from the flexible shoulder 1250, 1252 to the slot 1270. The increased leg width may reduce the flexibility of the legs 1250, 1252 and increase the resistance provided by the legs 1250, 1252 during attachment of the slider 1132 onto and attempted removal of the slider 1132 from the fastening strips 130, 131 in the vertical Z axis 106.

Figs. 63-65 show another embodiment of a slider 2132 that provides more rigid legs 2260, 2262 than the embodiment illustrated in Fig. 8. Moreover, in a relaxed position the legs 2260, 2262 of the slider 2132 project inwardly, substantially perpendicular to the side portions 2174, 2176. The slider 2132 provides more flexing in the side portions 2174, 2176 of the slider 2132 than does the first embodiment.

Figs. 63-65 sequentially illustrate the attachment of the slider 2132 onto the fastening strips 130, 131 in the vertical Z axis 106. Fig. 63 depicts occluded fastening strips 130, 131 and the slider 2132 in a relaxed position. The occluded fastening strips 130, 131 are immediately below the slot 2280. The slider 2132 is then moved in the vertical Z axis 106 toward the fastening strips 130, 131. The fastening strips 130, 131 engage the legs 2260, 2262 and force the side portions 2174, 2176 to deflect outwardly in the transverse Y axis 104 thus widening the slot 2280. The fastening strips 130, 131 are guided into the slider by the tapered surfaces of the occlusion members 2200, 2210. Fig. 64 illustrates the fastening strips 130, 131 moving through the slot 2280. The base portions 138, 148 of the fastening strips 130, 131 are interposed between the legs 2260, 2262. Fig. 65 represents the attached position of the slider 2132 on fastening strips 130, 131. Once the side portions 2174, 2176 return to their relaxed position, the fastening strips 130, 131 no longer fit through the slot 2280.

Fig. 66 illustrates another embodiment of a slider 2332 and fastening strips 2330, 2331. Protrusions 2356, 2366 are located on the fastening strips 2331, 2330 and the shoulders 2460, 2462 engage the protrusions 2356, 2366 to hold the fastening strips 2331, 2330 within the slider 2332.

Figs. 67 and 68 show another embodiment of a slider 3132. The side portions 3174, 3176 of this embodiment have lower embossments 3290, 3292 which extend below the first and second rear legs 3260, 3262 in the vertical Z axis 106. The slider 3132 utilizes a tool 3500 to engage the lower embossments 3290, 3292 and force the side portions 3174, 3176 apart in the transverse Y axis 104 during attachment of the slider 3132 onto the fastening strips 130, 131. Figs. 67 and 68 also sequentially illustrate attachment of the slider 3132 onto the fastening strips 130, 131 in the vertical Z axis 106. Fig. 67 depicts occluded fastening strips 130, 131 and the slider 3132 as the tool 3500 forces the side portions 3174, 3176 apart in the transverse Y axis 104 thus widening the slot 3280. The fastening strips 130, 131 are immediately below the slot 3280. The fastening strips 130, 131 are guided into the slider 3132 by the tapered surfaces of the occlusion members 3200, 3210 as the slider 3132 is moved downwardly in the vertical Z axis 106. Fig. 68 represents the attached position of the slider 3132 on fastening strips 130, 131. Once the side portions 3174, 3176 return to their relaxed position, the fastening strips 130, 131 no longer fit through the slot 3280.

The present invention effectuates attachment of a slider onto fastening strips in the vertical Z axis 106 while preventing removal of the slider from the fastening strips in the vertical Z axis 106 thereafter.

Another aspect of the present invention prevents removal of the slider from the fastening strips in the horizontal X axis 102 once the slider has been attached to the fastening strips. Fig. 69 illustrates the slider 132
5 attached to the fastening strips 130, 131. As may be readily seen, a portion of the fastening strips 130, 131 is interposed between the rigid occlusion member 200 and the flexible occlusion member 210. The inwardly biased arms 214, 216 of the flexible occlusion member 210 are
10 forced to a position substantially parallel to the occluded fastening strips 130, 131. First and second detents 135, 137 are provided along the second fastening strip 131 for engagement with the arms 214, 216 of the flexible occlusion member 210. Once the slider 132 is
15 moved a sufficient distance along the fastening strips 130, 131 in the horizontal X axis 102, the respective arm 214, 216 of the flexible occlusion member 210 engages either detent 135, 137.

20 For example, if the slider 132 is continually moved in the deocclusion direction 116, the arm 216 of the flexible occlusion member 210 will eventually engage the detent 137. The detent 137 allows the arm 216 of the flexible occlusion member 210 to return to its original
25 inwardly extending position and engage the detent 137 as shown in Fig. 70. The arm 216 of the flexible occlusion member 210 will resist further movement of the slider 132 in the horizontal X axis 102 in the deocclusion direction 116. As a result, the slider 132 may only be removed from
30 the fastening strips 130, 131 in the horizontal X axis 102 by either tearing through the fastening strips 130, 131 or by breaking and/or deforming the flexible occlusion member 210 of the slider 132. It will be appreciated that the detents 135, 137 of the fastening strip 131 may be
35 provided on either the first or second fastening strip 130, 131 and should be on the fastening strip which contacts the flexible occlusion member 210. In this

connection, the slider 132 may provide the flexible occlusion member 210 on either the first or second side portion 174, 176 of the of slider 132 so as to correspond to the detents 135, 137 of the fastening strips 130, 131.

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Fig. 71 illustrates another embodiment of a slider 4132. The slider 4132 provides two flexible occlusion members 4200, 4210 rather than a rigid occlusion member and a flexible occlusion member. The slider 4132 may be used with fastening strips 130, 131, and either the first fastening strip 130 or the second fastening strip 131 may provide detents 135, 137 to engage the arms 4214, 4216, 4224, 4226 of the flexible occlusion members 4200, 4210. Also, one fastening strip 130 may provide a first detent in proximity with one end of the fastening strips 130, 131 while the second fastening strip 131 provides a second detent in proximity with the other end of the fastening strips 130, 131. Similarly, for additional resistance against slider 4132 removal in the horizontal X axis 102, both the first fastening strip 130 and the second fastening strip 131 may provide detents to engage the arms 4214, 4216, 4224, 4226 of the flexible occlusion members 4200, 4210.

Figs. 72 and 73 illustrate another embodiment of a slider 5132 made in accordance with the present invention. Fig. 72 illustrates a portion of the fastening strips 130, 131 interposed between rigid occlusion members 5200, 5210, 5220, 5230. Additionally, a peg 5300 is provided for engaging the detents 135, 137 of the second fastening strip 131. Once the slider 5132 is moved a sufficient distance along the fastening strips 130, 131 in the horizontal X axis 102, the peg 5300 engages either detent 135, 137. For example, if the slider 5132 is continually moved in the deocclusion direction 116 the peg 5300 will eventually engage the detent 137 as illustrated in Fig. 73. The peg 5300 will resist further movement of the

slider 5132 in the horizontal X axis 102 in the deocclusion direction 116. As a result, the slider 5132 may only be removed from the fastening strips 130, 131 in the horizontal X axis 102 by either tearing through the fastening strips 130, 131 or by breaking and/or deforming the peg 5300 of the slider 5132. It will be appreciated that the detents 135, 137 of the second fastening strip 131 may be provided on either the first or second fastening strip 130, 131 and should be on the fastening strip which contacts the peg 5300. In this connection, the slider 5132 may provide the peg 5300 on either side of the slider 5132 so as to correspond to the detents 135, 137 of the fastening strips 130, 131.

Referring to Figs. 72 and 73, the slider 5132 has a separator 5172 and shoulders 5240, 5242, 5260, 5262. The separator 5172 has an axis 5173 which is parallel to the longitudinal X axis 102. In addition, the shoulders 5240, 5242, 5260, 5262 have an axis 5173 which is parallel to the longitudinal X axis 102.

Figs. 74-79 illustrate another embodiment of a slider 5432. The slider 5432 has a peg 5600 similar to the embodiment shown in Figs. 72 and 73. However, the separator 5472 is at an angle to the longitudinal axis 102 as shown in Figs. 74 and 75. Specifically, the separator 5472 has an axis 5473 which is at an angle of approximately 10-15 degrees from the longitudinal X axis 102. In addition, the legs 5540, 5542, 5560, 5562 are at an angle to the longitudinal axis 102. Specifically, the legs and shoulders 5540, 5542 have an axis 5543 which is at an angle of approximately 10-15 degrees from the longitudinal X axis 102. In addition, the legs and shoulders 5560, 5562 have an axis 5563 which is at an angle of approximately 10-15 degrees from the longitudinal X axis 102. The angles of the separator and the legs facilitate the movement of the slider 5432 along the

fastening strips. As shown in Fig. 73, the fastening strips 130, 131 make a gradual bend 5573 as opposed to the bend shown in Fig. 72. Thus, the slider 5432 may move with less resistance.

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Referring to Figs. 78 and 79, the peg 5600 is provided for engaging the detents 135, 137 of the second fastening strip 131. Once the slider 5432 is moved a sufficient distance along the fastening strips 130, 131 in the horizontal X axis 102, the peg 5600 engages either detent 135, 137. For example, if the slider 5432 is continually moved in the deocclusion direction 116, the peg 5600 will eventually engage the detent 137 as illustrated in Fig. 79. The peg 5600 will resist further movement of the slider 5432 in the horizontal X axis 102 in the deocclusion direction 116. As a result, the slider 5432 may only be removed from the fastening strips 130, 131 in the horizontal X axis 102 by either tearing through the fastening strips 130, 131 or by breaking and/or deforming the peg 5600 of the slider 5432. It will be appreciated that the detents 135, 137 of the second fastening strip 131 may be provided on either the first or second fastening strip 130, 131 and should be on the fastening strip which contacts the peg 5600. In this connection, the slider 5432 may provide the peg 5600 on either side of the slider 5432 so as to correspond to the detents 135, 137 of the fastening strips 130, 131.

The slider of the present invention may incorporate several configurations. However, the slider should facilitate attachment of the slider onto the fastening strips in the vertical Z axis and prevent the removal of the slider from the fastening strips in the vertical Z axis and the horizontal X axis. Furthermore, the slider facilitates proper orientation of the fastening strips within the slider during operation. Proper orientation of the fastening strips within the slider is usually

accomplished by providing legs which support the respective fastening strips. The design of the slider is further dictated by the configuration of fastening strips utilized.

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Figs. 80-82 illustrate interlocking fastening strips of different configurations and the corresponding slider design. As shown in Fig. 80, the interlocking fastening strips may alternatively comprise "arrowhead-type" closure strips. As described more fully in U.S. Patents 5,007,142 and 5,020,194, "arrowhead-type" closure strips typically include a first fastening strip 6130 with an engagement portion 6136, and an associated second fastening strip 6131 with an engagement portion 6137. In use, the first fastening strip 6130 and the second fastening strip 6131 are selectively occluded and deoccluded by moving the slider 6132 in the appropriate direction.

Additionally, the interlocking fastening strips may comprise "profile" closure strips, as shown in Fig. 81. As described more fully in U.S. Patent 5,664,299, "profile" closure strips typically include a first fastening strip 7130 and a second fastening strip 7131. The first and second fastening strips 7130 and 7131 are selectively coupled and decoupled by moving the slider member 7132 in the appropriate direction.

Also, the interlocking fastening strips may be "rolling action" fastening strips 8130, 8131 as shown in Fig. 82 and described in U.S. Patent 5,007,143.

The invention may also be used with a slider and fastening strips wherein the separator finger extends into the closure elements without extending completely through the closure elements. More specifically, the first closure element includes a first closure portion and a second closure portion and the second closure element

includes a third closure portion and a fourth closure portion. The first closure portion engages the third closure portion and the second closure portion engages the fourth closure portion. The separator finger extends
5 between the first and third closure portions but not between the second and fourth closure portions. One example is U.S. Patent 5,664,299 which is incorporated herein by reference.

10 Although several interlocking fastening strip embodiments have been specifically described and illustrated herein, it will be readily appreciated by those skilled in the art that other kinds, types, or forms of fastening strips may alternatively be used without
15 departing from the scope or spirit of the present invention.

 The interlocking fastening strips of the present invention may be manufactured by extrusion through a die.
20 In addition, the fastening strips may be manufactured to have approximately uniform cross-sections. This not only simplifies the manufacturing of a closure device, but also contributes to the physical flexibility of the closure device.

25 Generally, the interlocking fastening strips of the present invention may be formed from any suitable thermoplastic material including, for example, polyethylene, polypropylene, nylon, or the like, or from a
30 combination thereof. Thus, resins or mixtures of resins such as high density polyethylene, medium density polyethylene, and low density polyethylene may be employed to prepare the interlocking fastening strips of the present invention. In most instances, the fastening
35 strips are made from low density polyethylene. The selection of the appropriate thermoplastic material, however, is related to the particular design of the

fastening strips, the Young's Modulus of the thermoplastic material, and the desired elasticity and flexibility of the strips.

5 When the fastening strips of the present invention are used in a sealable bag, the fastening strips and the films that form the body of the bag may be conveniently manufactured from heat sealable material. In this way, the bag may be economically formed by using an
10 aforementioned thermoplastic material and by heat sealing the fastening strips to the bag. In most instances, the bag is made from a mixture of high pressure, low density polyethylene and linear, low density polyethylene.

15 The fastening strips of the present invention may be manufactured by extrusion or other known methods. For example, the closure device may be manufactured as individual fastening strips for later attachment to the bag or may be manufactured integrally with the bag. In
20 addition, the fastening strips may be manufactured with or without flange portions on one or both of the fastening strips depending upon the intended use of the closure device or expected additional manufacturing operations.

25 Generally, the closure device of the present invention can be manufactured in a variety of forms to suit the intended use. In practicing the present invention, the closure device may be integrally formed on the opposing side walls of the container or bag, or
30 connected to the container by the use of any of many known methods. For example, a thermoelectric device may be applied to a film in contact with the flange portion of the fastening strips or the thermoelectric device may be applied to a film in contact with the base portion of
35 fastening strips having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and a flange portion or base

portion of the fastening strips. Suitable thermoelectric devices include heated rotary discs, traveling heater bands, resistance-heated slide wires, and the like. The connection between the film and the fastening strips may also be established by the use of hot melt adhesives, hot jets of air to the interface, ultrasonic heating, or other known methods. The bonding of the fastening strips to the film stock may be carried out either before or after the film is U-folded to form the bag. In any event, such bonding is done prior to side sealing the bag at the edges by conventional thermal cutting. In addition, the first and second fastening strips may be positioned on opposite sides of the film. Such an embodiment would be suited for wrapping an object or a collection of objects such as wires. The first and second fastening strips should usually be positioned on the film in a generally parallel relationship with respect to each other, although this will depend on the intended use.

The slider may be multiple parts and snapped together. In addition, the slider may be made from multiple parts and fused or welded together. The slider may also be a one piece construction. The slider can be colored, opaque, translucent or transparent. The slider may be injection molded or made by any other method. The slider may be molded from any suitable plastic material, such as, nylon, polypropylene, polystyrene, acetal, toughened acetal, polyketone, polybutylene terephthalate, high density polyethylene, polycarbonate or ABS (acrylonitrile-butadiene-styrene). The selection of the material may be determined by the characteristics to be achieved by the slider.

In summary, the present invention affords a closure device with interlocking fastening strips, a slider which facilitates the occlusion and deocclusion of the fastening strips, and a flexibly resistant attaching means which

facilitates attachment of the slider onto the fastening strips in the vertical Z axis and prevents the removal of the slider from the fastening strips in the vertical Z axis thereafter. A flexible occlusion member prevents
5 removal of the slider in the horizontal X axis.

From the foregoing it will be understood that modifications and variations may be effectuated to the disclosed structures – particularly in light of the
10 foregoing teachings – without departing from the scope or spirit of the present invention. As such, no limitation with respect to the specific embodiments described and illustrated herein is intended or should be inferred. Indeed, the following claims are intended to cover all
15 modifications and variations that fall within the scope and spirit of the present invention. In addition, all references and copending applications cited herein are hereby incorporated by reference in their entireties.

WHAT IS CLAIMED IS:

1. A closure device comprising:
 - 5 a first fastening strip;
 - a second fastening strip;
 - a slider adapted to be slidably disposed on said fastening strips and facilitating the occlusion of said fastening strips when moved towards a first end thereof
 - 10 and facilitating the deocclusion of said fastening strips when moved towards a second end thereof, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening
 - 15 strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, a first detent at said first end of said fastening strips, said slider comprising a housing
 - 20 having a protrusion for engaging said first detent of said fastening strips when said slider is moved to said first end of said fastening strips thereby preventing removal of said slider from said first end of said fastening strips in said longitudinal X axis.
 - 25
2. The invention as in claim 1, wherein said protrusion comprises a peg extending inwardly in the transverse Y axis.
- 30 3. The invention as in claim 1 wherein said fastening strips have a first position when the protrusion engages the first detent and a second position when the protrusion is not engaged with the first detent.
- 35 4. The invention as in claim 3 wherein the first position is deflected from the second position.

5. The invention as in claim 4 wherein said housing has a void opposite the protrusion to allow the fastening strips to deflect.

5 6. The invention as in claim 5 wherein a first occlusion member is located on one side of the void and a second member is located on the other side of the void.

7. The invention as in claim 6 wherein a second
10 occlusion member is located opposite the first occlusion member.

8. The invention as in claim 1 further comprising a second detent at said second end of said fastening strips,
15 said protrusion engaging said second detent when the slider is moved to said second end of said fastening strips thereby preventing removal of said slider from said second end of said fastening strips in said longitudinal X axis.

20

9. The invention as in claim 8 wherein said fastening strips have a first position when the protrusion engages the second detent and a second position when the protrusion is not engaged with the second detent.

25

10. The invention as in claim 9 wherein the first position is deflected from the second position.

11. The invention as in claim 1 wherein said
30 housing having a separator to facilitate the occlusion of said fastenings trips.

12. The invention as in claim 11 wherein said separator has a separator axis, said separator axis is
35 parallel to the longitudinal X axis.

13. The invention as in claim 11 wherein said separator has a separator axis, said separator axis is at an angle to the longitudinal X axis.

5 14. The invention as in claim 1 wherein said housing having shoulders to engage the fastening strips.

15 15. The invention as in claim 14 wherein said shoulders have shoulder axis, said shoulder axis is
10 parallel to the longitudinal X axis.

15 16. The invention as in claim 14 wherein said shoulders have shoulder axis, said shoulder axis is at an angle to the longitudinal X axis.

15 17. The invention as in claim 12 wherein said housing having shoulders to engage the fastenings strips, said shoulders have a shoulder axis, said shoulder axis is parallel to the longitudinal X axis.

20 18. The invention as in claim 13 wherein said housing having shoulders to engage the fastening strips, said shoulders have a shoulder axis, said shoulder axis is at an angle to longitudinal X axis.

25 19. The invention as in claim 18 wherein the shoulder axis is parallel to the separator axis.

30 20. The invention as in claim 1, wherein said fastening strips comprise U-channel closure type fastening strips.

35 21. The invention as in claim 1, wherein said fastening strips comprise arrowhead type fastening strips.

22. The invention as in claim 1, wherein said fastening strips comprise profile type fastening strips.

23. The invention as in claim 1 wherein said fastening strips comprise rolling action fastening strips.

5

24. A slider adapted to be slidably disposed on a first and second fastening strip wherein a first detent is provided at a first end of said fastening strips, said slider facilitating the occlusion of said fastening strips
10 when moved towards said first end thereof and facilitating the deocclusion of said fastening strips when moved towards said second end thereof, said slider comprising:

a longitudinal X axis and a transverse Y axis, said
15 transverse Y axis being perpendicular to said longitudinal X axis, said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis;

20 a housing having a protrusion for engaging said first detent of said fastening strips when said slider is moved to said first end of said fastening strips, said protrusion thereby preventing removal of said slider from said first end of fastening strips in said longitudinal X
25 axis.

25. The invention as in claim 24, wherein said protrusion comprises a peg extending inwardly in the transverse Y axis.

30

26. The invention as in claim 24 wherein said fastening strips have a first position when the protrusion engages the first detent and a second position when the protrusion is not engaged with the first detent.

35

27. The invention as in claim 26 wherein the first position is deflected from the second position.

28. The invention as in claim 27 wherein said housing has a void opposite the protrusion to allow the fastening strips to deflect.

5

29. The invention as in claim 28 wherein a first occlusion member is located on one side of the void and a second member is located on the other side of the void.

10

30. The invention as in claim 29 wherein a second occlusion member is located opposite the first occlusion member.

15

31. The invention as in claim 24 further comprising a second detent at said second end of said fastening strips, said protrusion engaging said second detent when the slider is moved to said second end of said fastening strips thereby preventing removal of said slider from said second end of said fastening strips in said longitudinal X axis.

20

32. The invention as in claim 31 wherein said fastening strips have a first position when the protrusion engages the second detent and a second position when the protrusion is not engaged with the second detent.

25

33. The invention as in claim 32 wherein the first position is deflected from the second position.

30

34. The invention as in claim 24 wherein said housing having a separator to facilitate the occlusion of said fastenings trips.

35

35. The invention as in claim 34 wherein said separator has a separator axis, said separator axis is parallel to the longitudinal X axis.

36. The invention as in claim 34 wherein said separator has a separator axis, said separator axis is at an angle to the longitudinal X axis.

5 37. The invention as in claim 24 wherein said housing having shoulders to engage the fastening strips.

38. The invention as in claim 37 wherein said shoulders have shoulder axis, said shoulder axis is
10 parallel to the longitudinal X axis.

39. The invention as in claim 37 wherein said shoulders have shoulder axis, said shoulder axis is at an angle to the longitudinal X axis.
15

40. The invention as in claim 35 wherein said housing having shoulders to engage the fastenings strips, said shoulders have a shoulder axis, said shoulder axis is parallel to the longitudinal X axis.
20

41. The invention as in claim 36 wherein said housing having shoulders to engage the fastening strips, said shoulders have a shoulder axis, said shoulder axis is at an angle to longitudinal X axis.
25

42. The invention as in claim 41 wherein the shoulder axis is parallel to the separator axis.

43. A container comprising:
30 first and second side walls, said first and second side walls including mating first and second fastening strips respectively, said first and second fastening strips comprising a closure device arranged to be interlocked over a predetermined length,
35 a slider adapted to be slidably disposed on said fastening strips and facilitating the occlusion of said fastening strips when moved towards a first end thereof

and facilitating the deocclusion of said fastening strips when moved towards a second end thereof, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being
5 perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, a first detent at said first end, said
10 slider comprising a housing having a protrusion for engaging said first detent of said fastening strips when said slider is moved to said first end of said fastening strips thereby preventing removal of said slider from said first end of said fastening strips in said
15 longitudinal X axis.

44. The invention as in claim 43, wherein said protrusion comprises a peg extending inwardly in the transverse Y axis.

20

45. The invention as in claim 43 wherein said fastening strips have a first position when the protrusion engages the first detent and a second position when the protrusion is not engaged with the first detent.

25

46. The invention as in claim 45 wherein the first position is deflected from the second position.

47. The invention as in claim 46 wherein said
30 housing has a void opposite the protrusion to allow the fastening strips to deflect.

48. The invention as in claim 47 wherein a first occlusion member is located on one side of the void and a
35 second member is located on the other side of the void.

49. The invention as in claim 48 wherein a second occlusion member is located opposite the first occlusion member.

5 50. The invention as in claim 43 further comprising
a second detent at said second end of said fastening
strips, said protrusion engaging said second detent when
the slider is moved to said second end of said fastening
strips thereby preventing removal of said slider from said
10 second end of said fastening strips in said longitudinal X
axis.

51. The invention as in claim 50 wherein said
fastening strips have a first position when the protrusion
15 engages the second detent and a second position when the
protrusion is not engaged with the second detent.

52. The invention as in claim 51 wherein the first
position is deflected from the second position.
20

53. The invention as in claim 43 wherein said
housing having a separator to facilitate the occlusion of
said fastenings trips.

25 54. The invention as in claim 53 wherein said
separator has a separator axis, said separator axis is
parallel to the longitudinal X axis.

55. The invention as in claim 53 wherein said
30 separator has a separator axis, said separator axis is at
an angle to the longitudinal X axis.

56. The invention as in claim 43 wherein said
housing having shoulders to engage the fastening strips.
35

57. The invention as in claim 56 wherein said shoulders have shoulder axis, said shoulder axis is parallel to the longitudinal X axis.

5 58. The invention as in claim 56 wherein said shoulders have shoulder axis, said shoulder axis is at an angle to the longitudinal X axis.

59. The invention as in claim 54 wherein said
10 housing having shoulders to engage the fastenings strips, said shoulders have a shoulder axis, said shoulder axis is parallel to the longitudinal X axis.

60. The invention as in claim 55 wherein said
15 housing having shoulders to engage the fastening strips, said shoulders have a shoulder axis, said shoulder axis is at an angle to longitudinal X axis.

61. The invention as in claim 60 wherein the
20 shoulder axis is parallel to the separator axis.

62. The invention as in claim 43, wherein said
fastening strips comprise U-channel closure type fastening
strips.

25

63. The invention as in claim 43, wherein said
fastening strips comprise arrowhead type fastening strips.

64. The invention as in claim 43, wherein said
30 fastening strips comprise profile type fastening strips.

65. The invention as in claim 43 wherein said
fastening strips comprise rolling action fastening strips.

35 66. A method for using a closure device comprising
the steps of:

providing a first fastening strip;

providing a second fastening strip;

providing a slider adapted to be slidably disposed on said fastening strips and facilitating the occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved towards a second end thereof, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, a first detent at said first end of said fastening strips, said slider comprising a housing having a protrusion for engaging said first detent of said fastening strips when said slider is moved to said first end of said fastening strips thereby preventing removal of said slider from said first end of said fastening strips in said longitudinal X axis;

moving said slider towards said first end and said protrusion engaging said first detent.

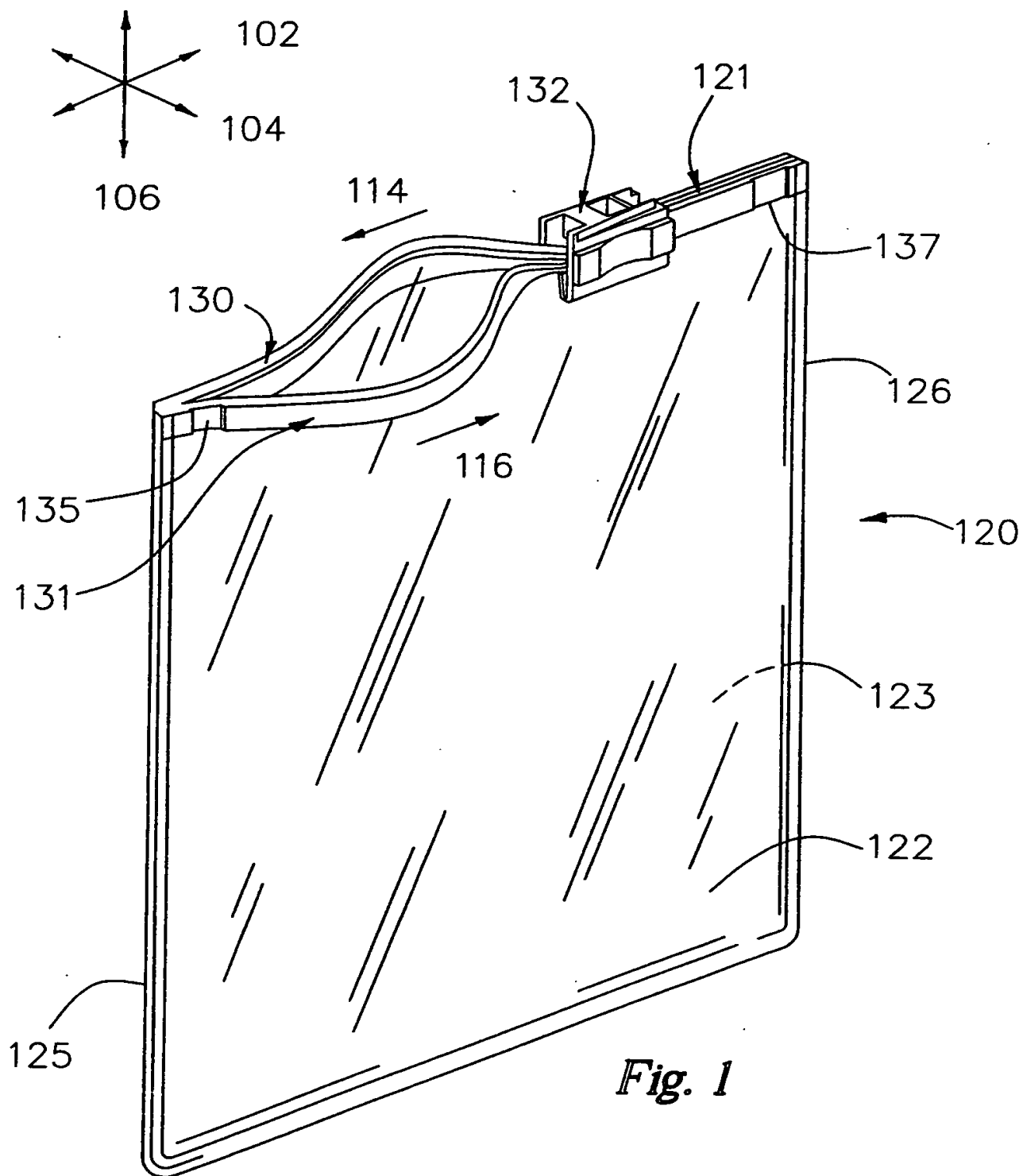
67. The invention as in claim 66, wherein said protrusion comprises a peg extending inwardly in the transverse Y axis.

68. The invention as in claim 66 wherein said fastening strips have a first position when the protrusion engages the first detent and a second position when the protrusion is not engaged with the first detent.

69. The invention as in claim 68 wherein the first position is deflected from the second position.

70. The invention as in claim 69 wherein said housing has a void opposite the protrusion to allow the fastening strips to deflect.

5 71. The invention as in claim 66 further providing a
second detent at said second end of said fastening strips,
said protrusion engaging said second detent when the
slider is moved to said second end of said fastening
strips thereby preventing removal of said slider from said
10 second end of said fastening strips in said longitudinal X
axis.

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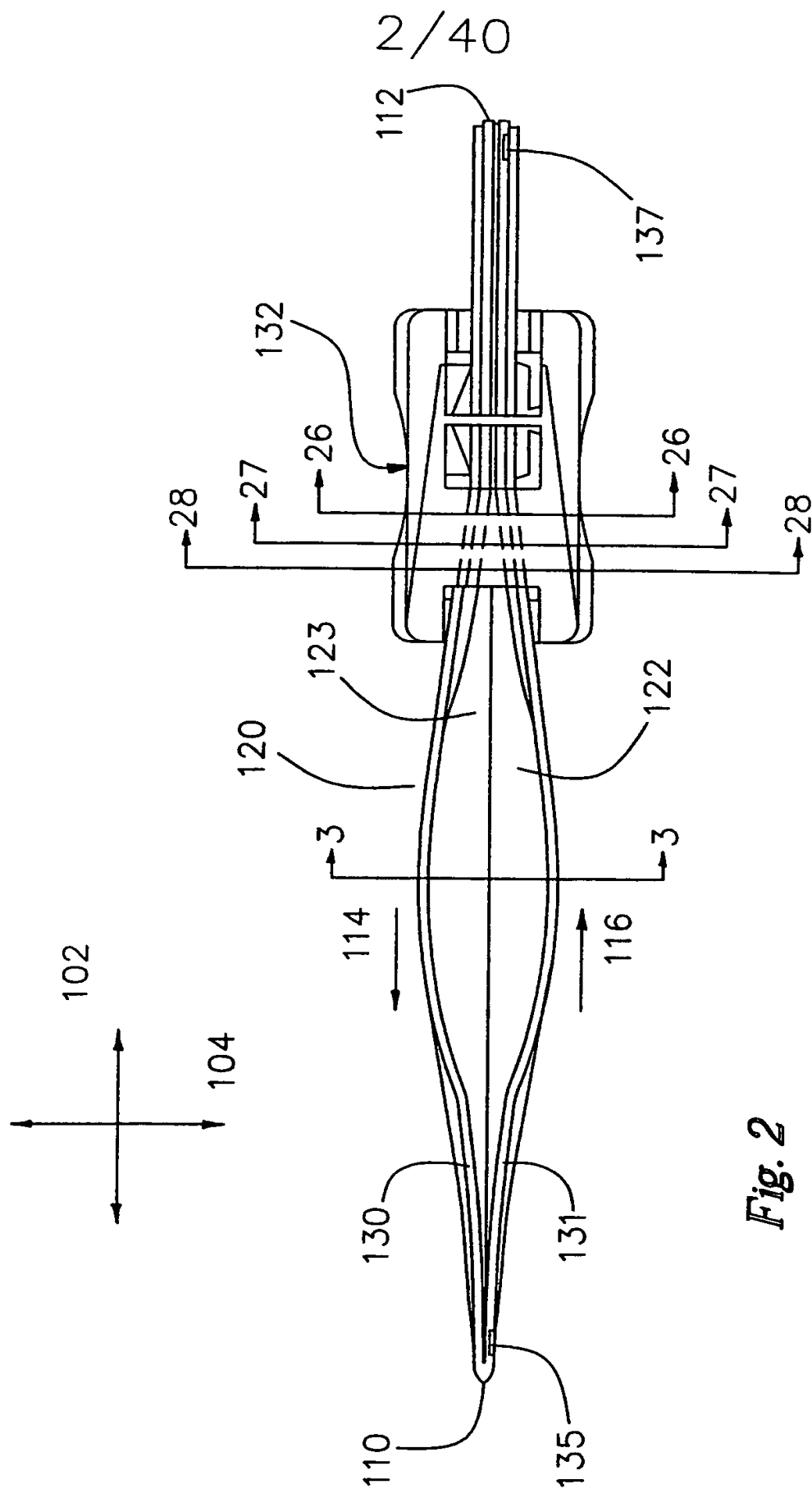
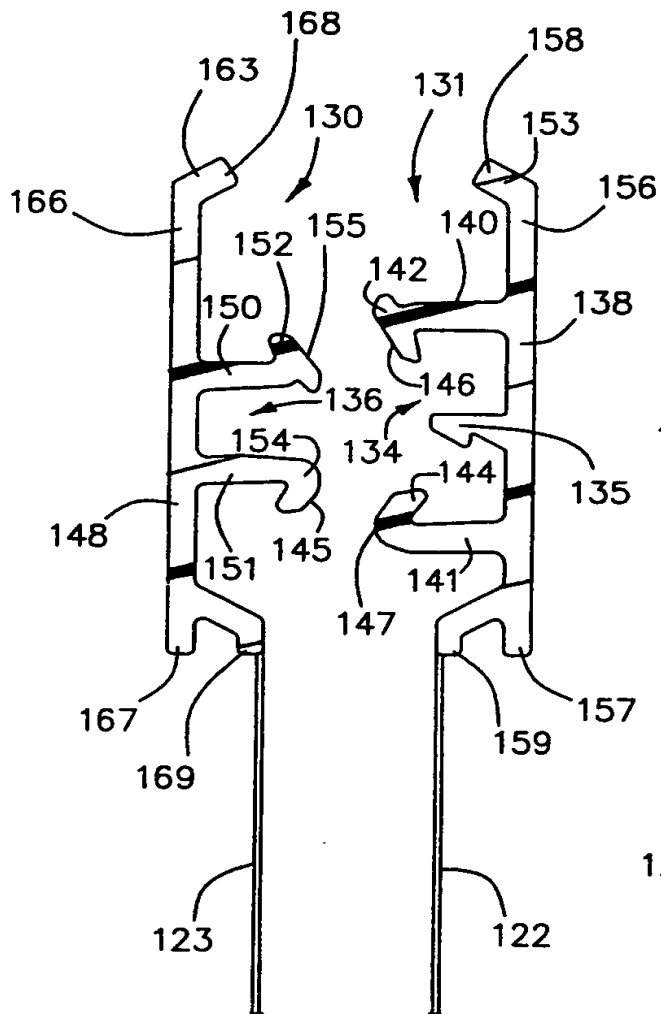
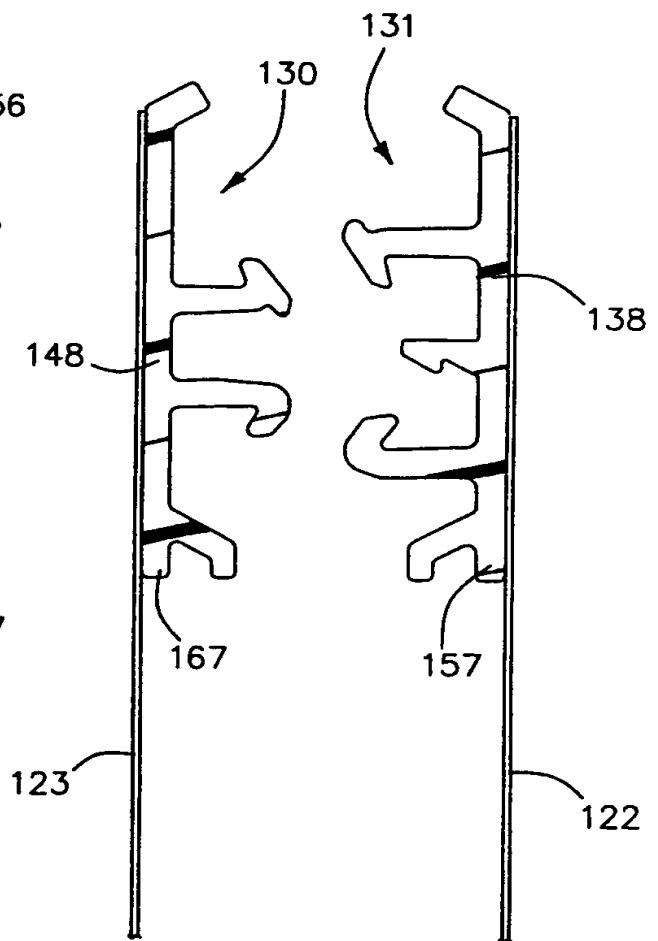
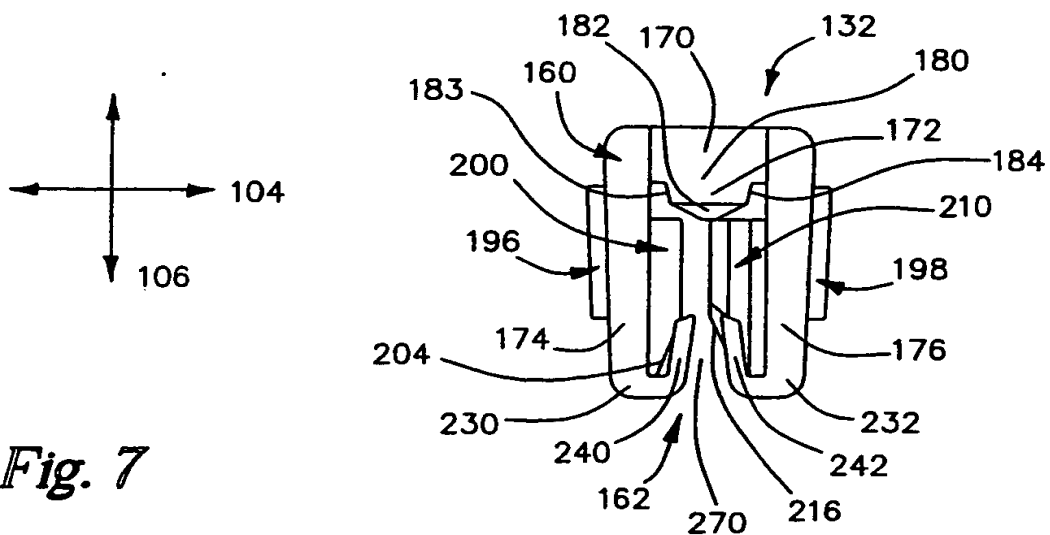
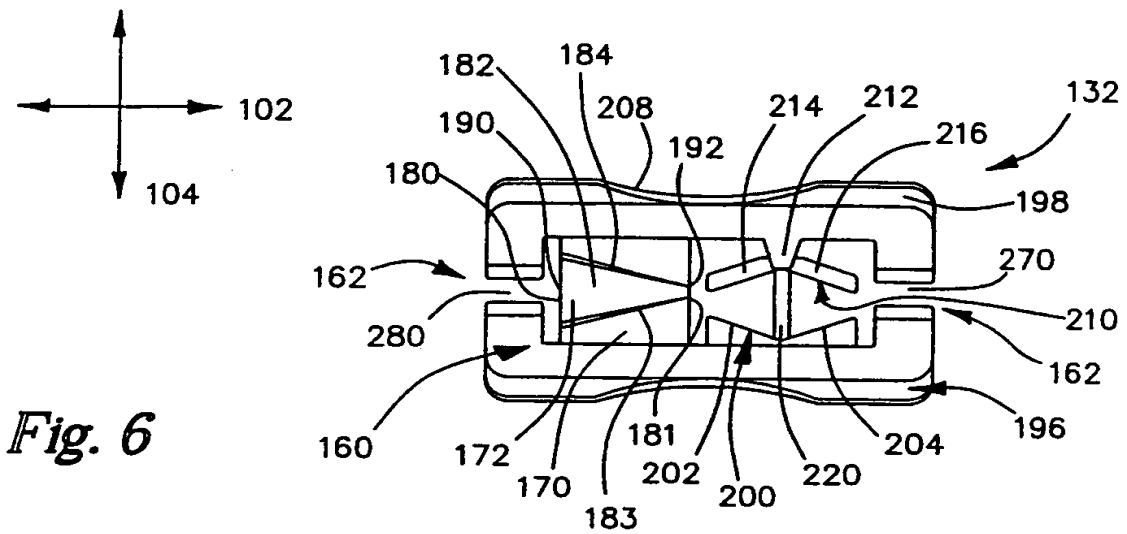
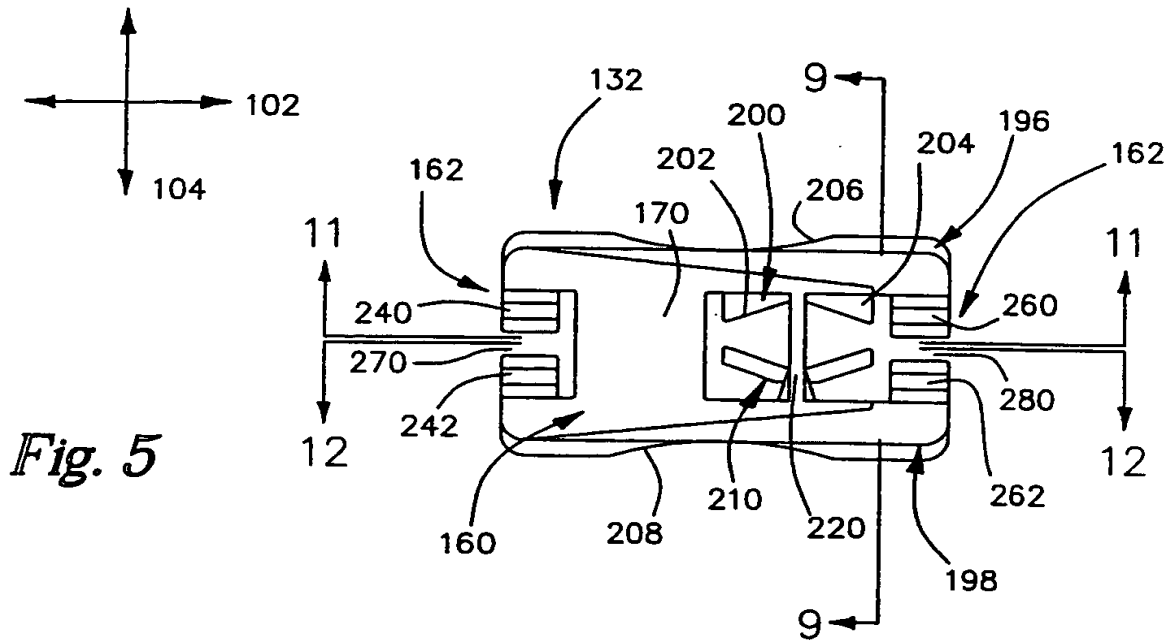


Fig. 2

3/40

*Fig. 3**Fig. 4*

4/40



5/40

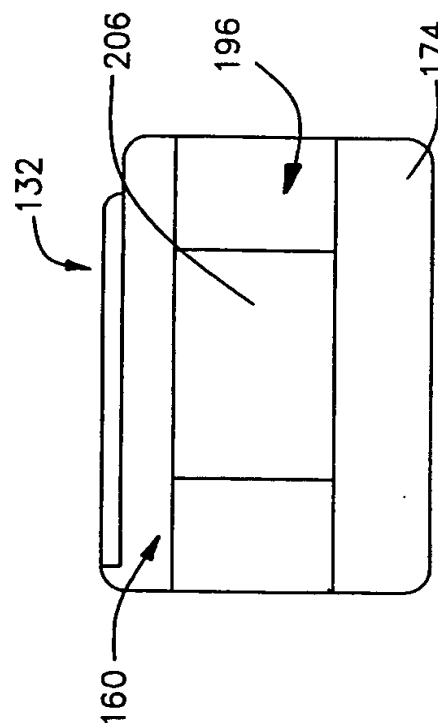
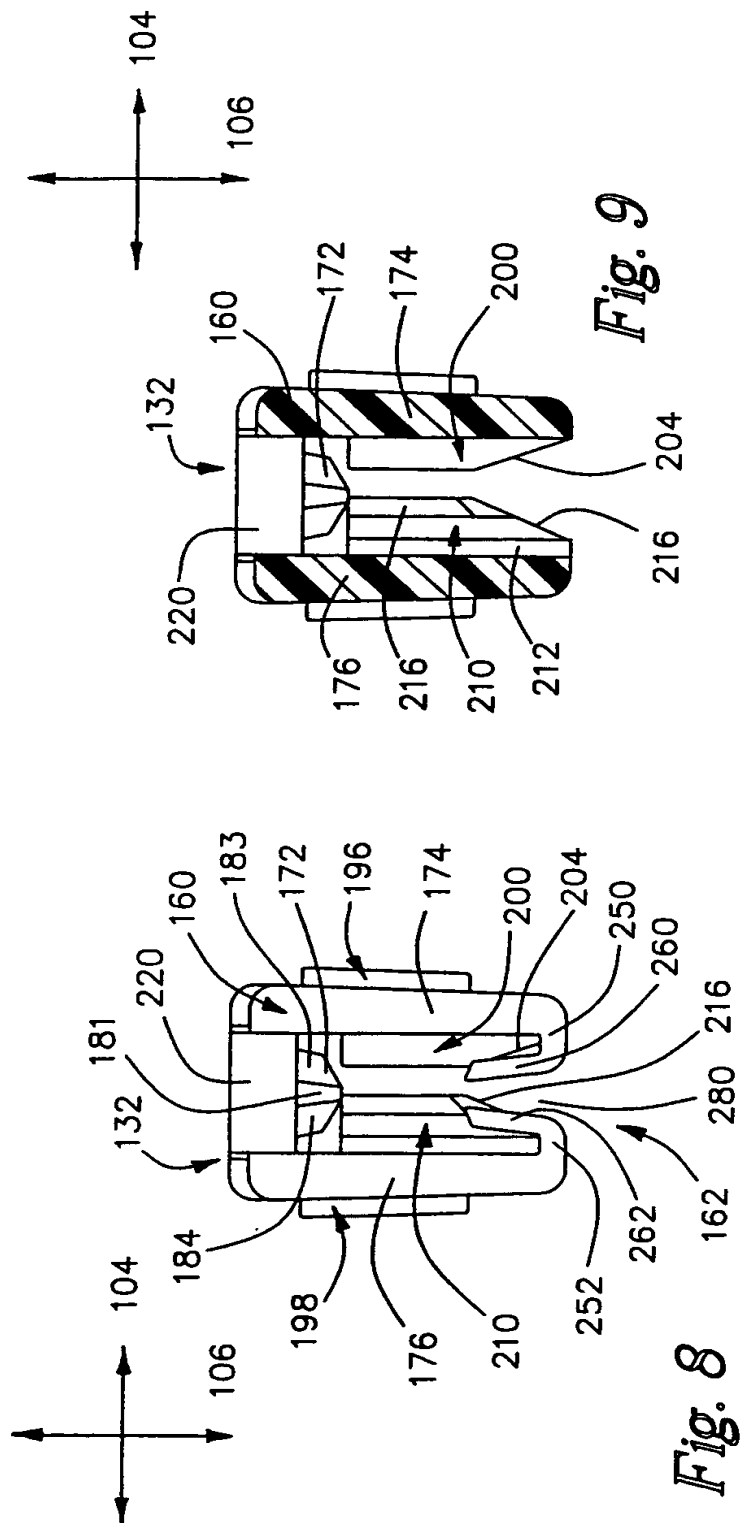
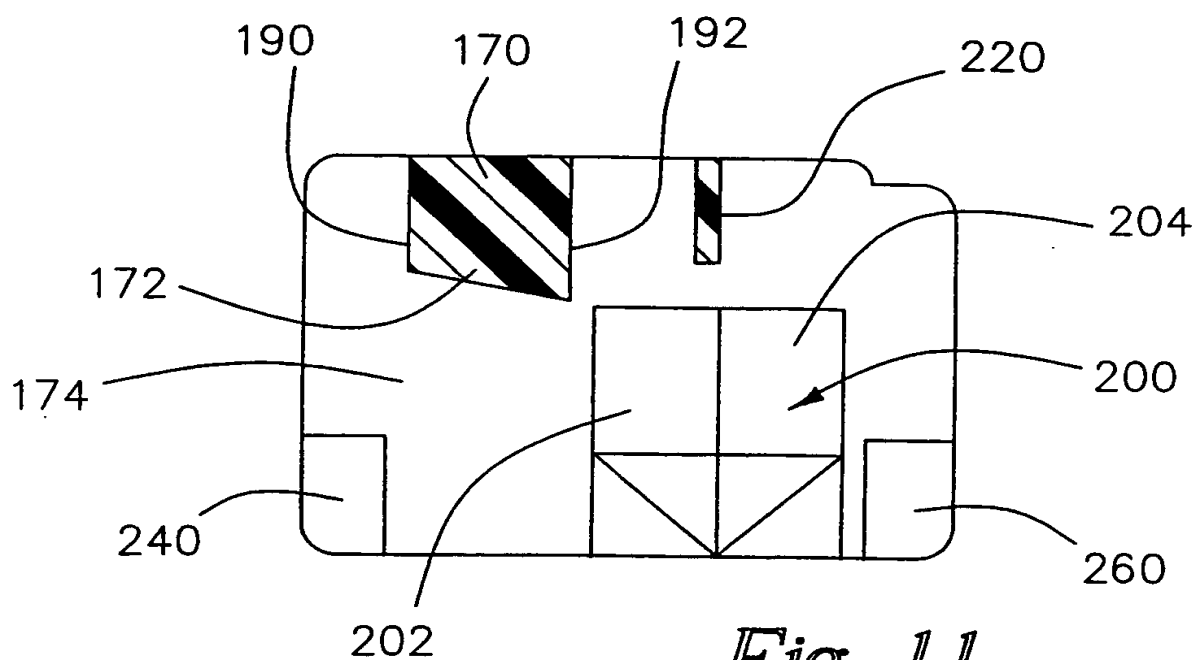
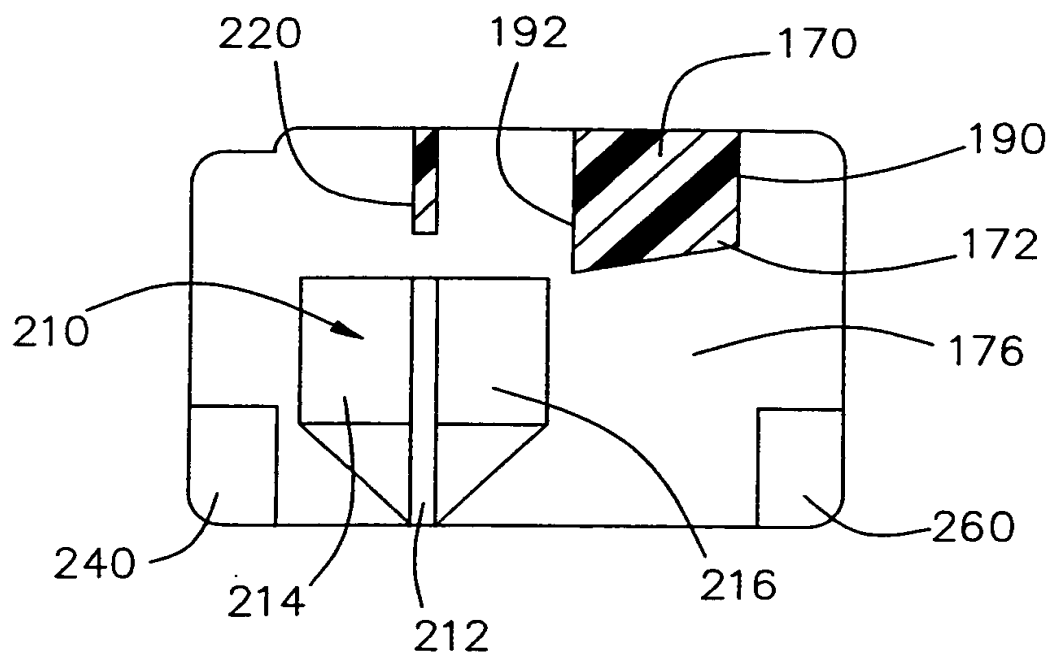


Fig. 10

6/40

*Fig. 11**Fig. 12*

7/40

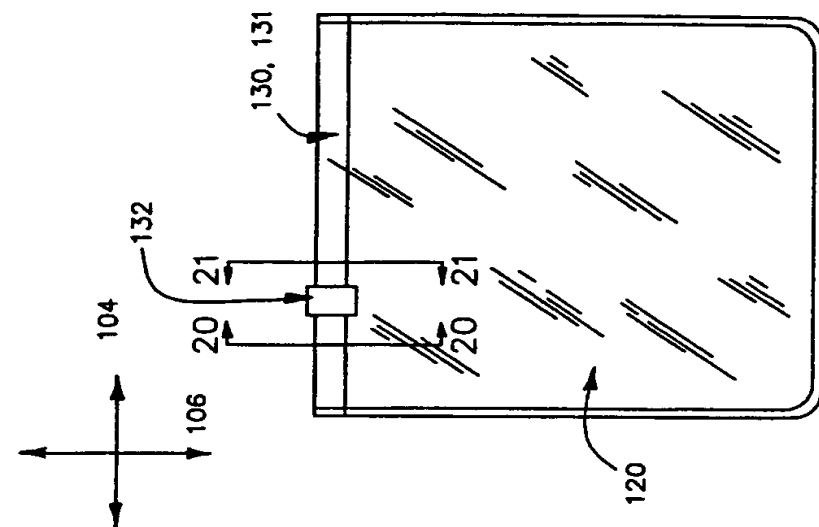


Fig. 13

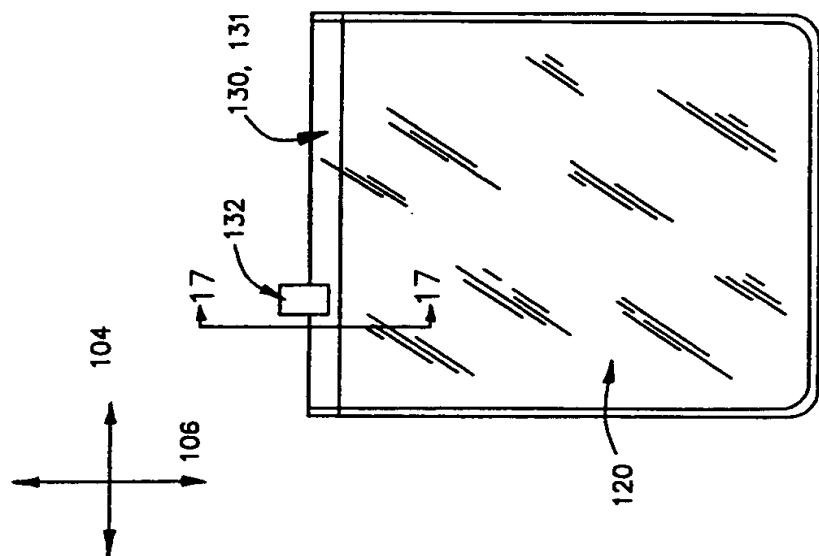


Fig. 14

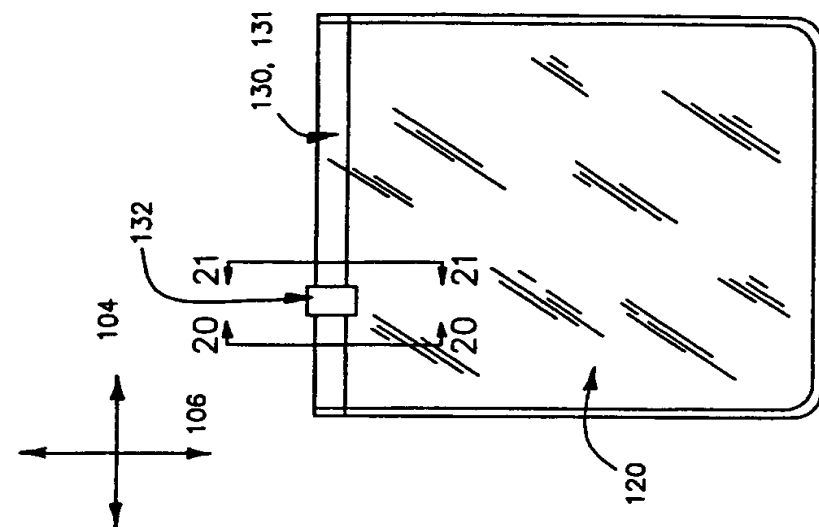


Fig. 15

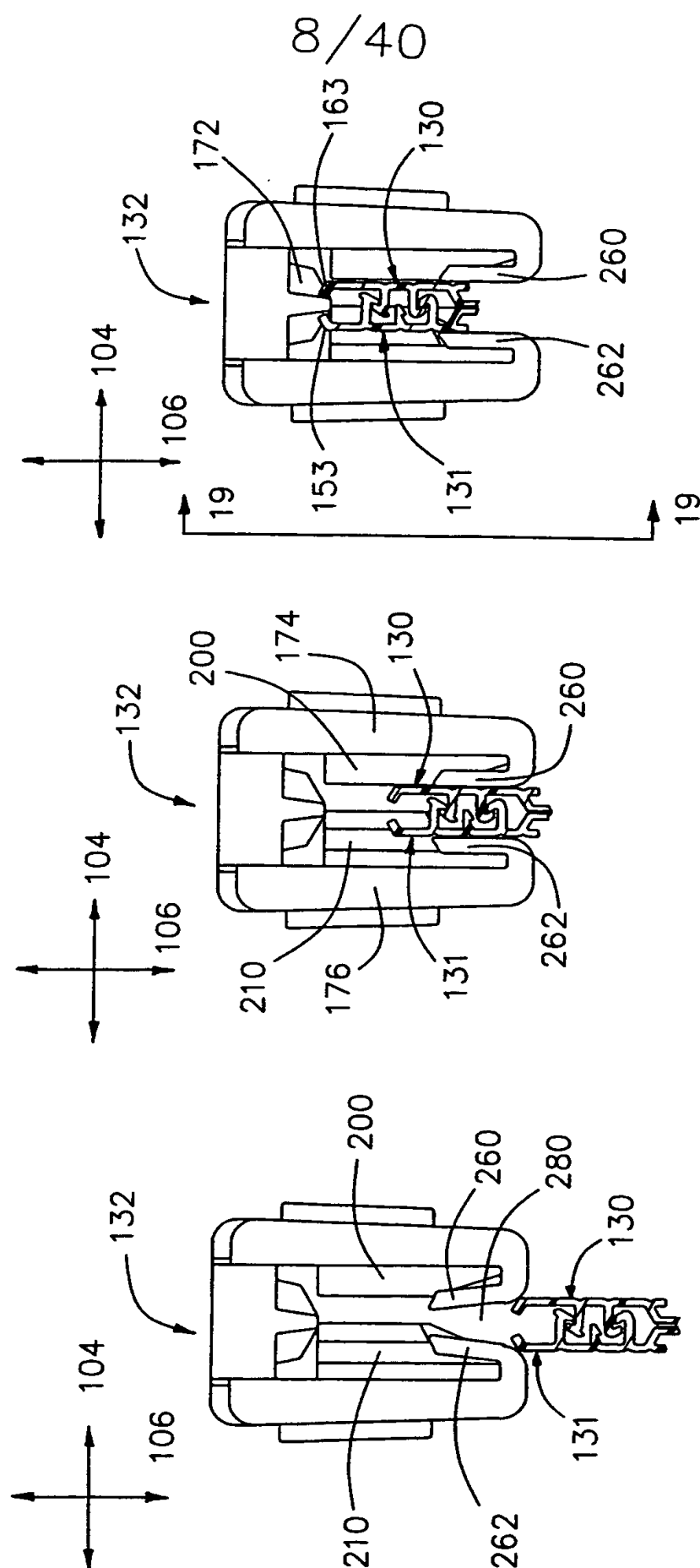


Fig. 16

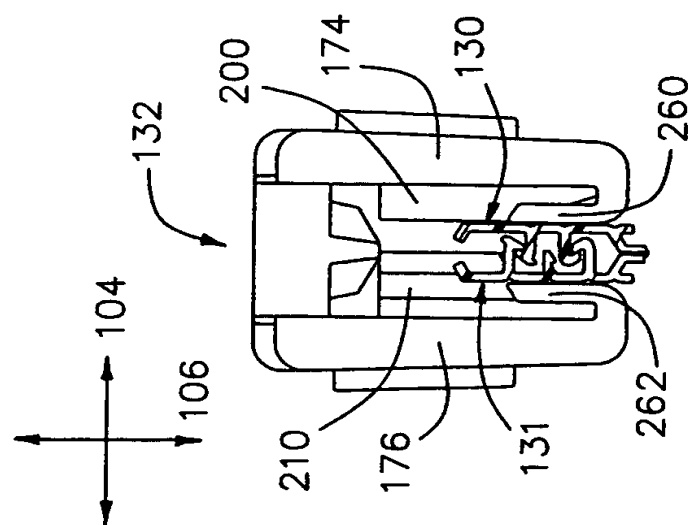


Fig. 17

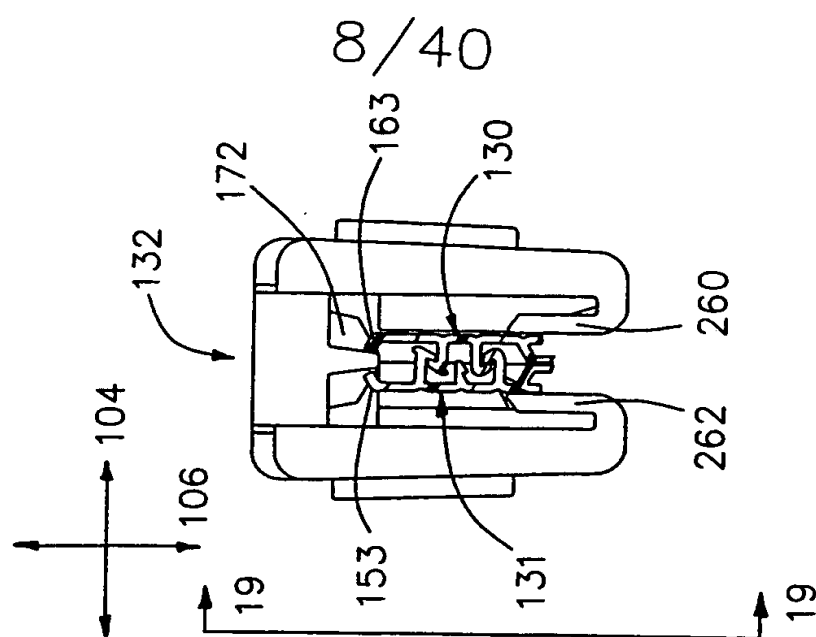


Fig. 18

9/40

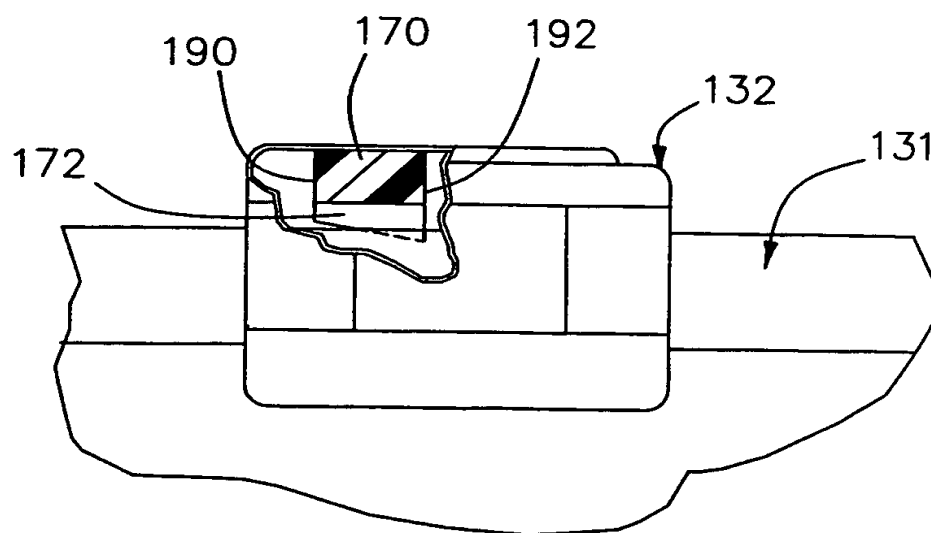
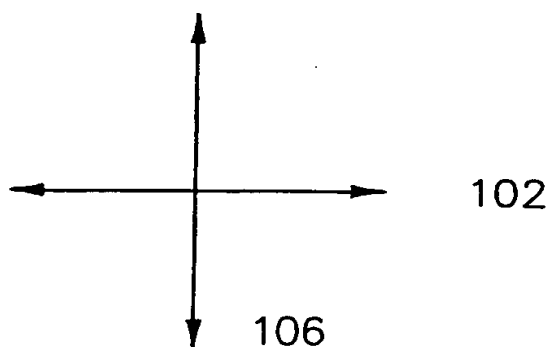
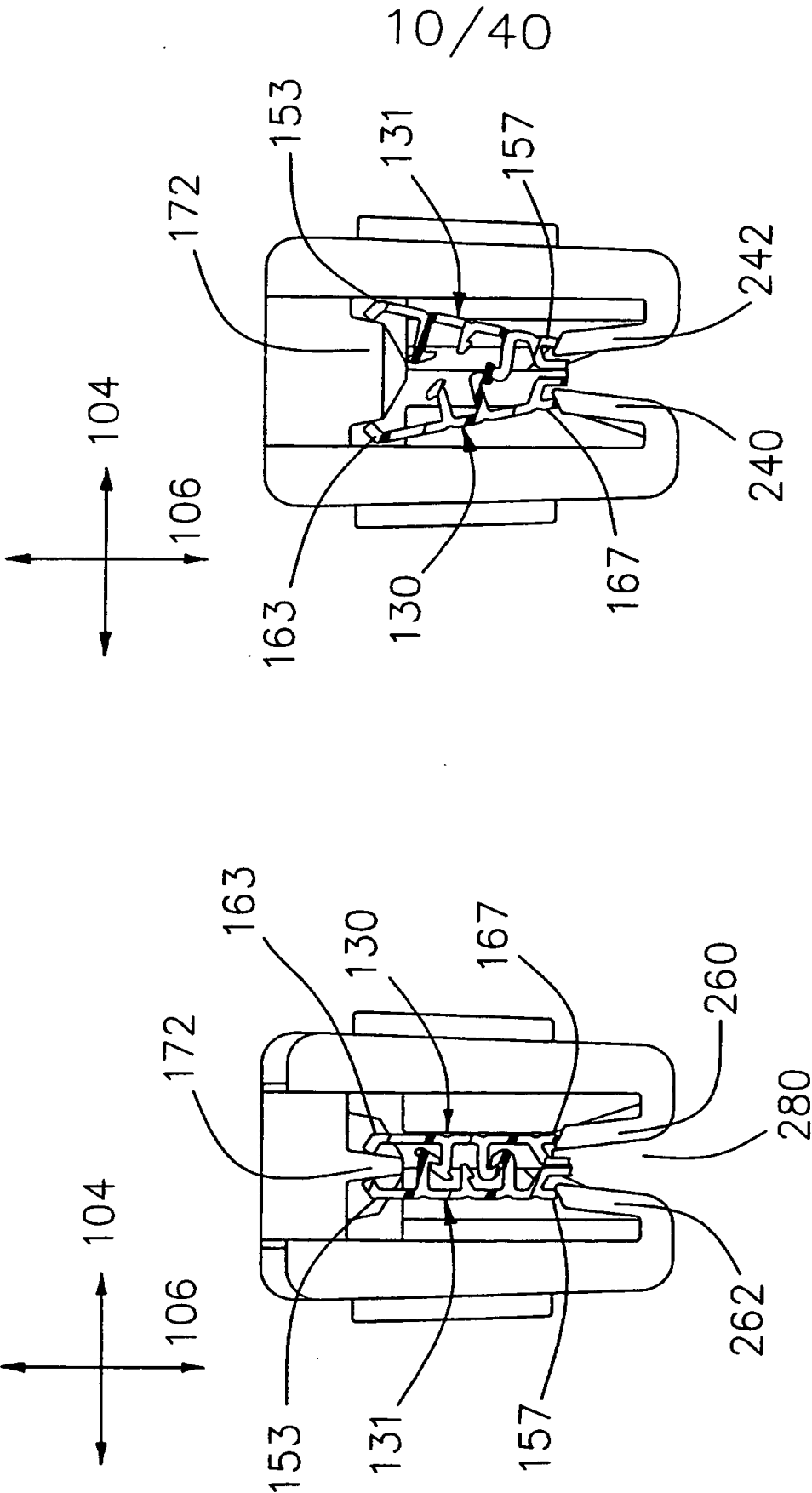


Fig. 19



11/40

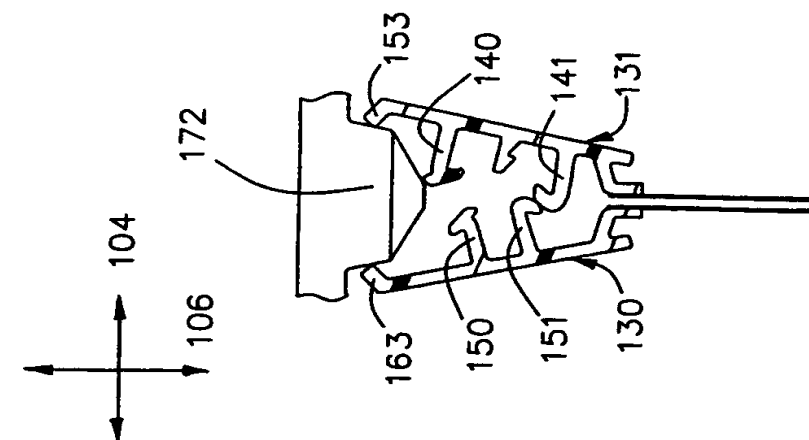


Fig. 22

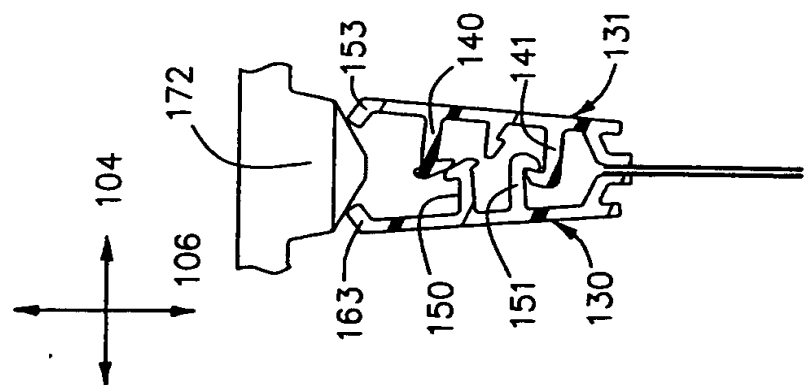


Fig. 23

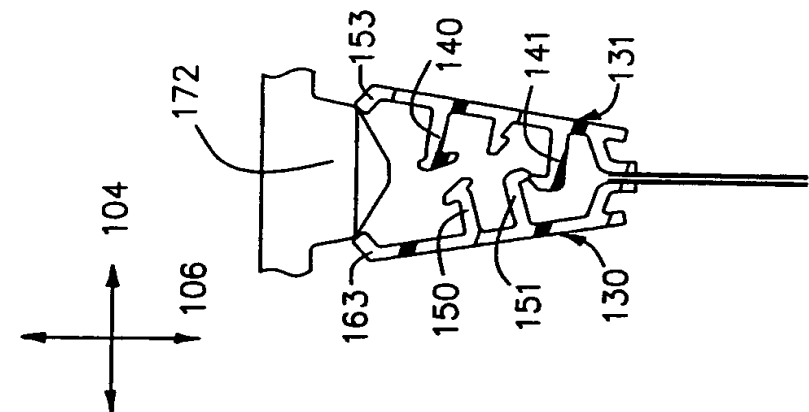


Fig. 24

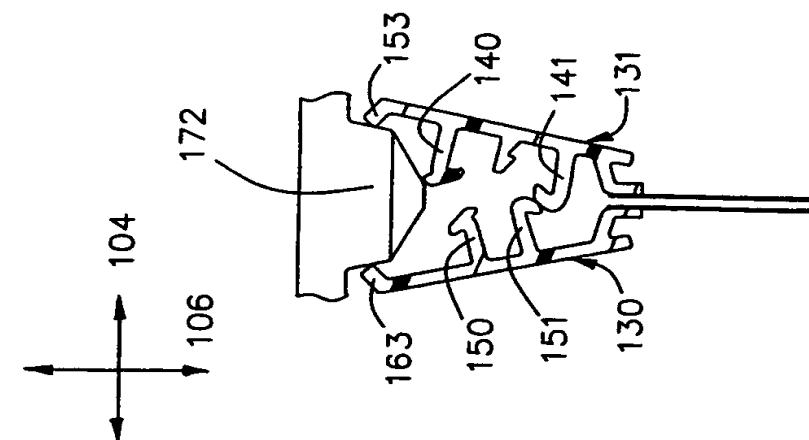


Fig. 25

12/40

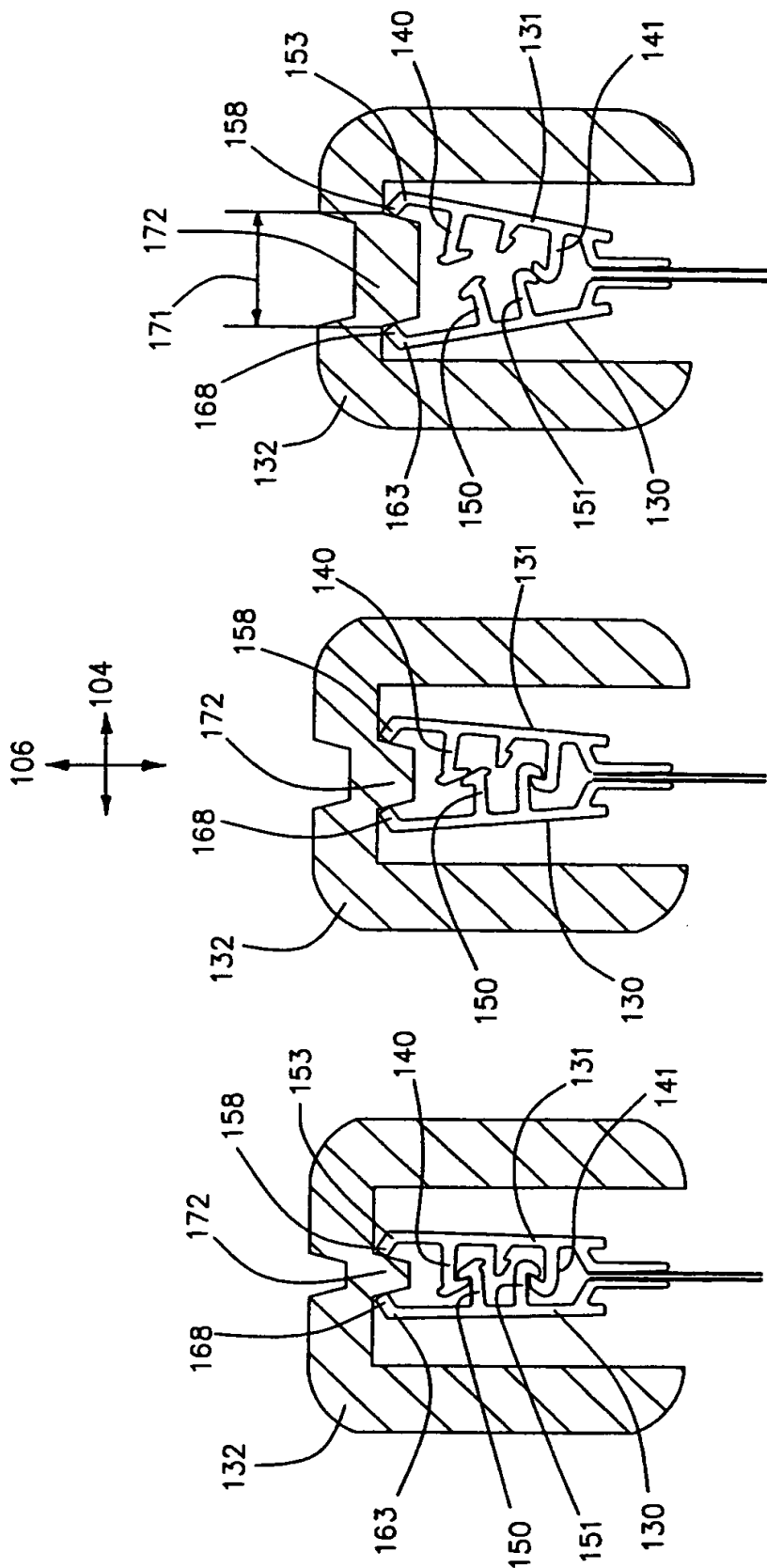


Fig. 28

Fig. 27

Fig. 26

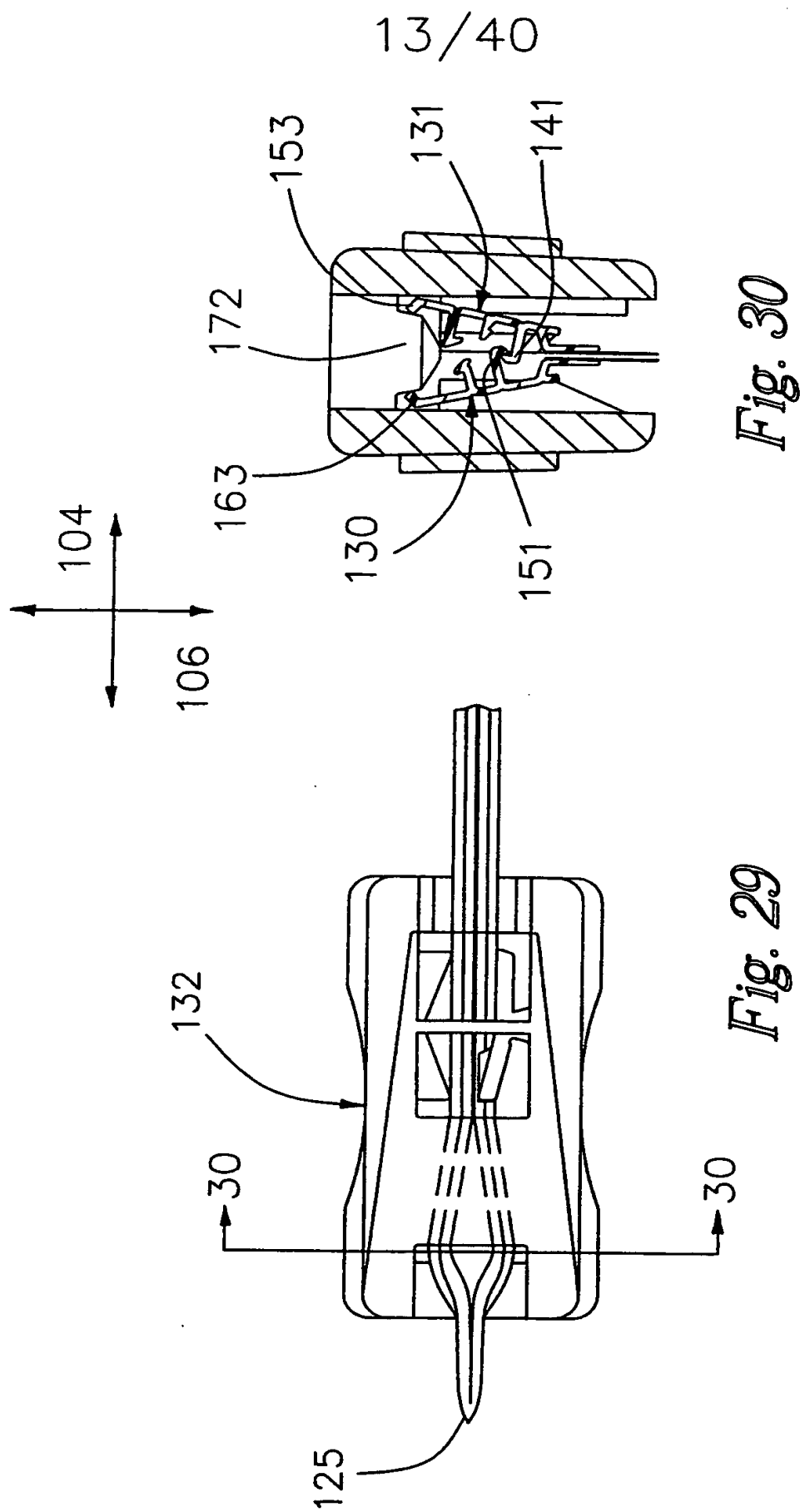


Fig. 30

Fig. 29

14/40

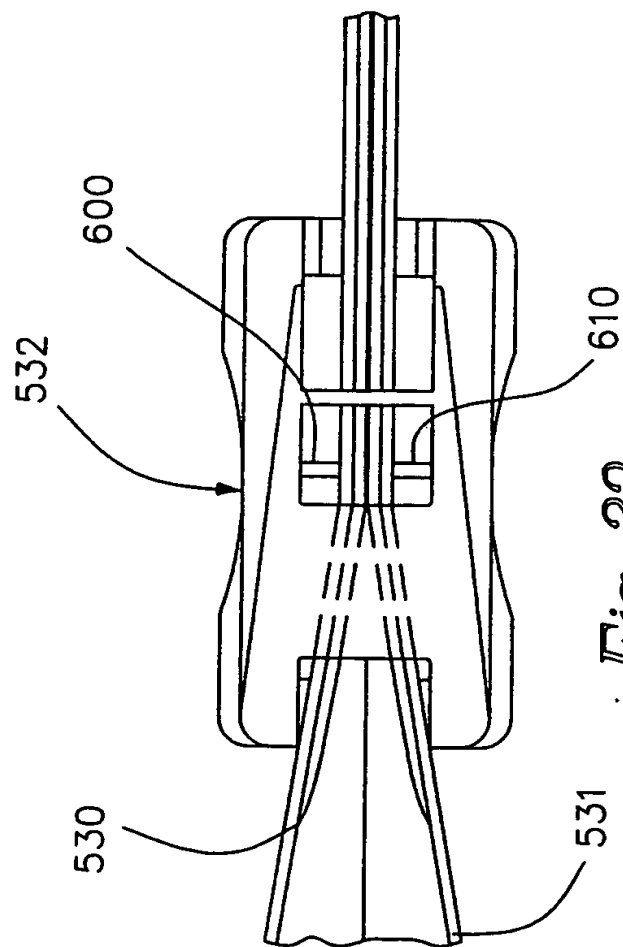


Fig. 32

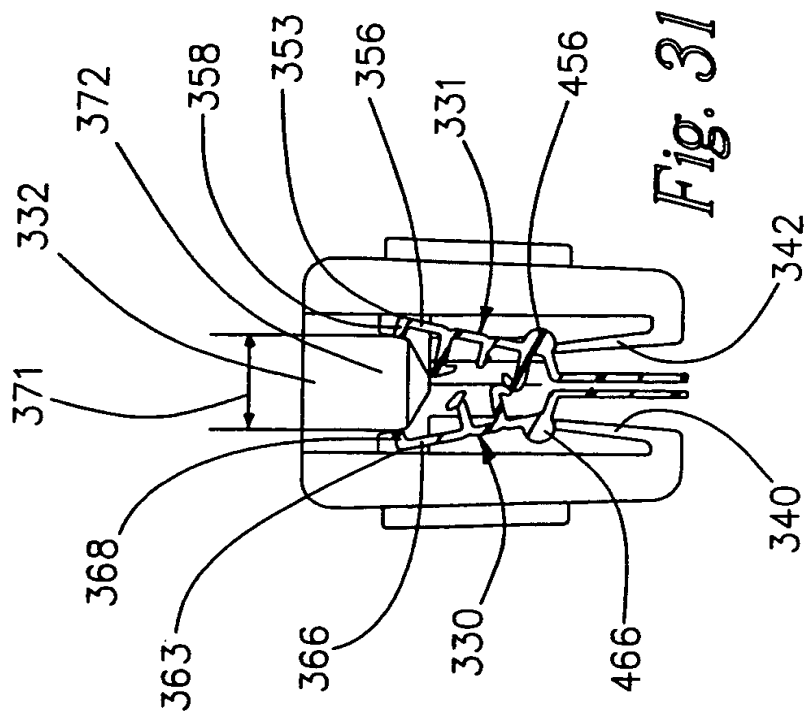
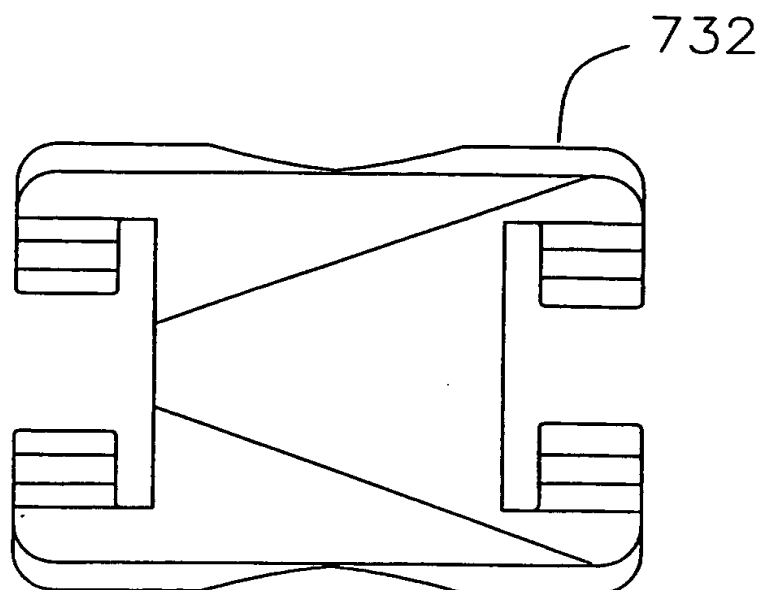
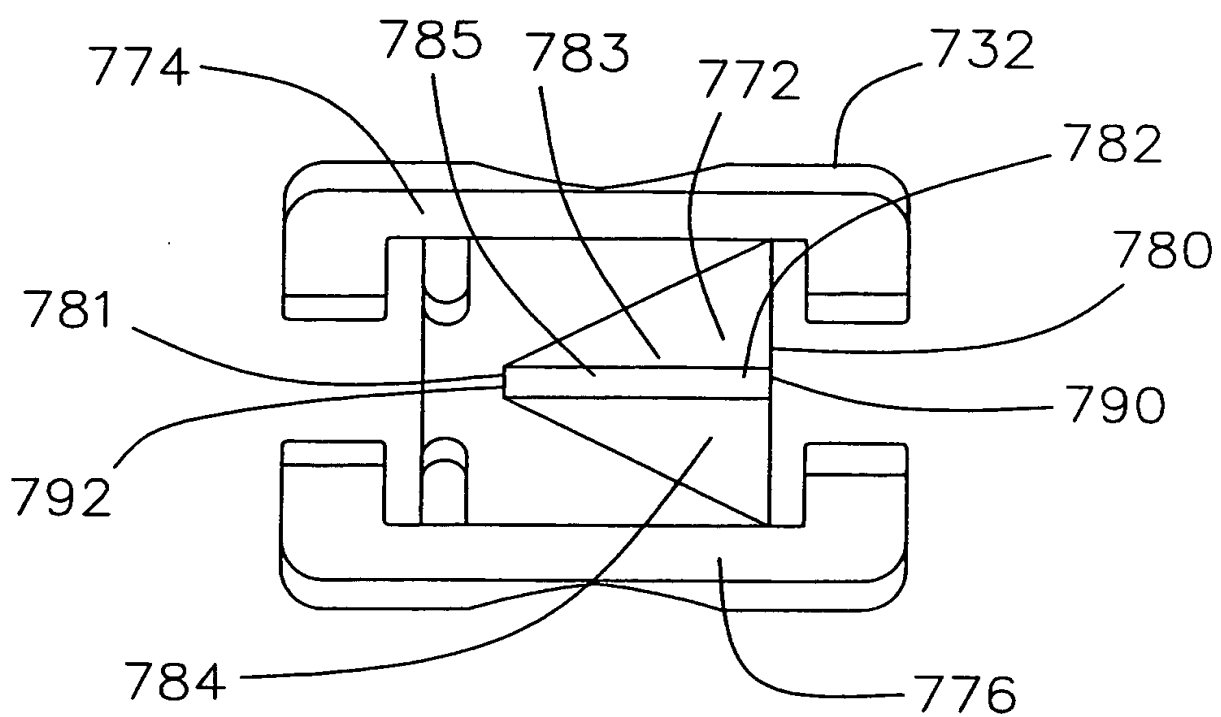


Fig. 31

15/40

*Fig. 33**Fig. 34*

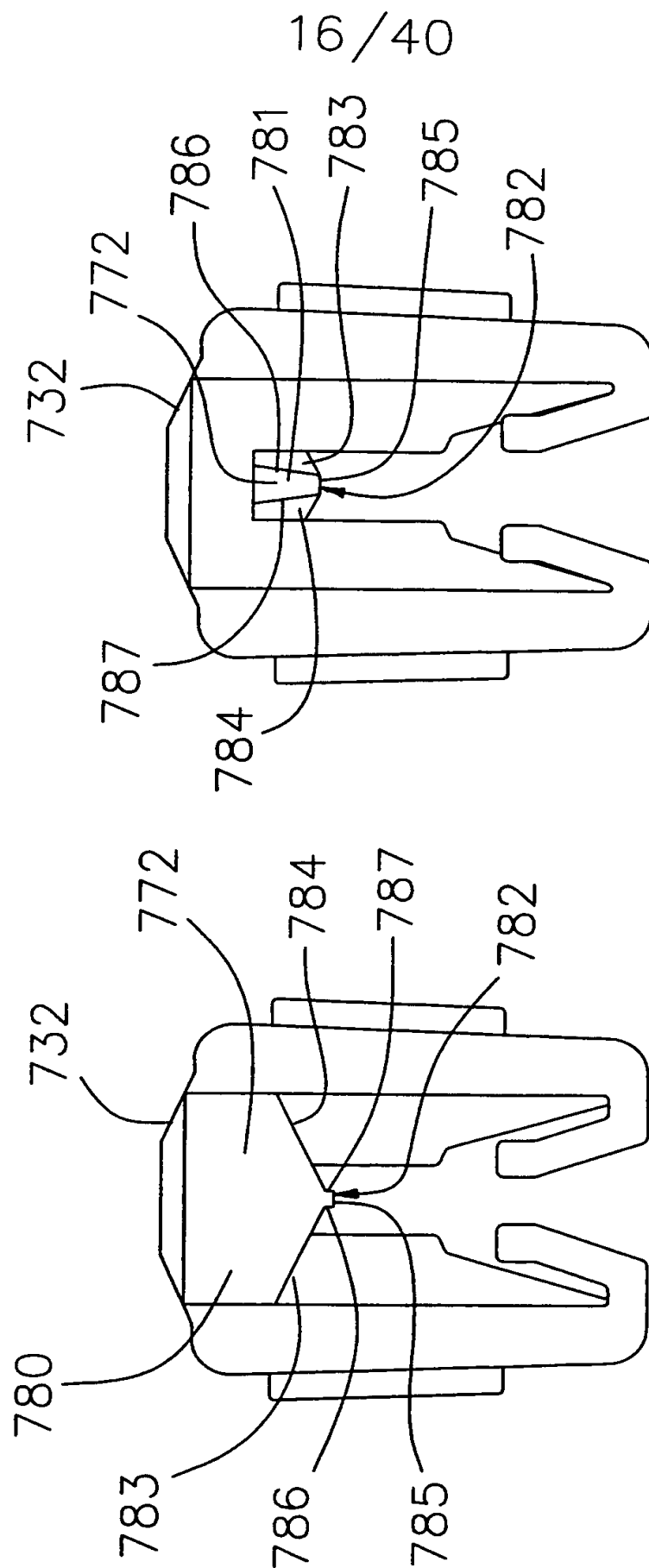


Fig. 35

Fig. 36

17/40

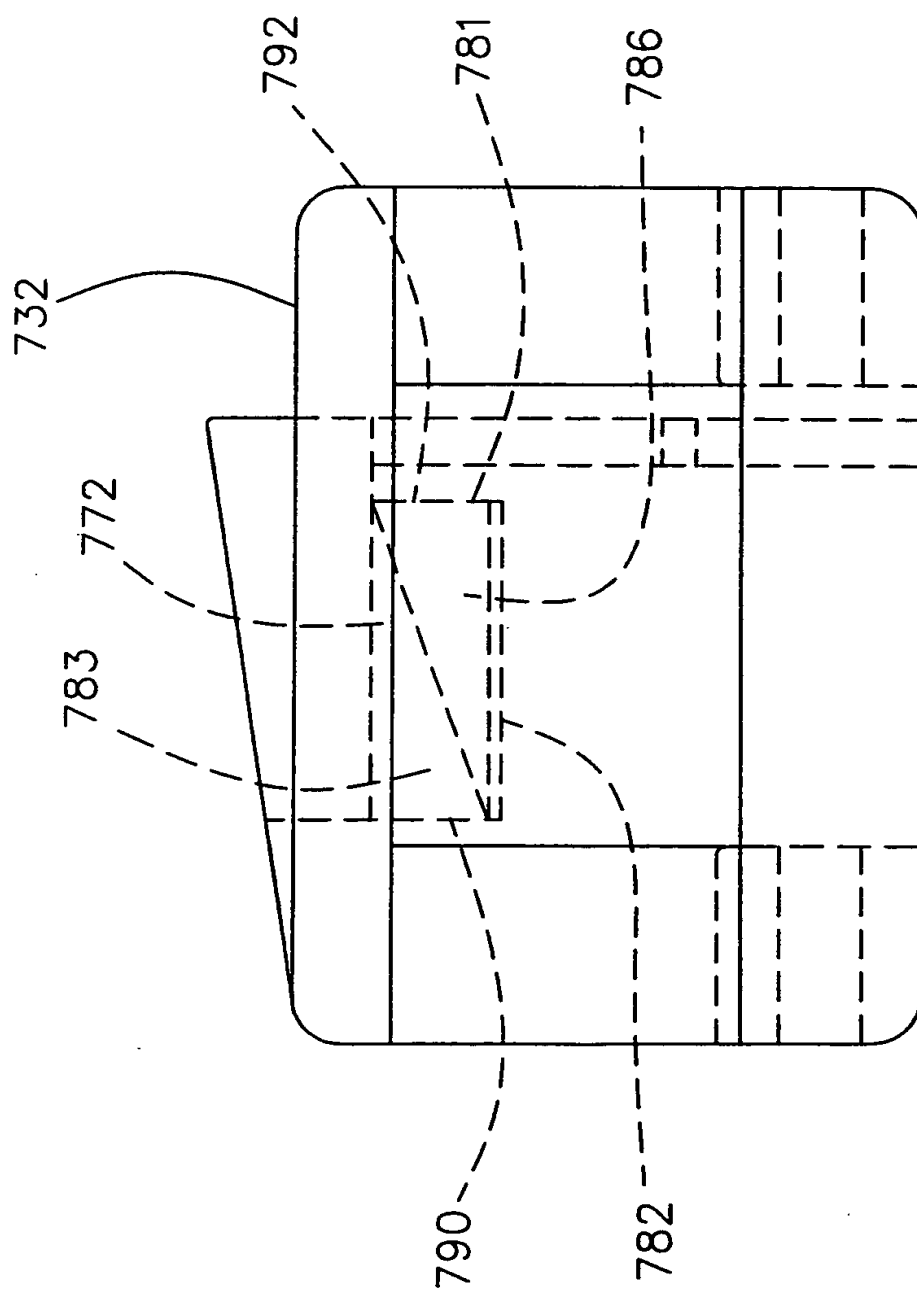
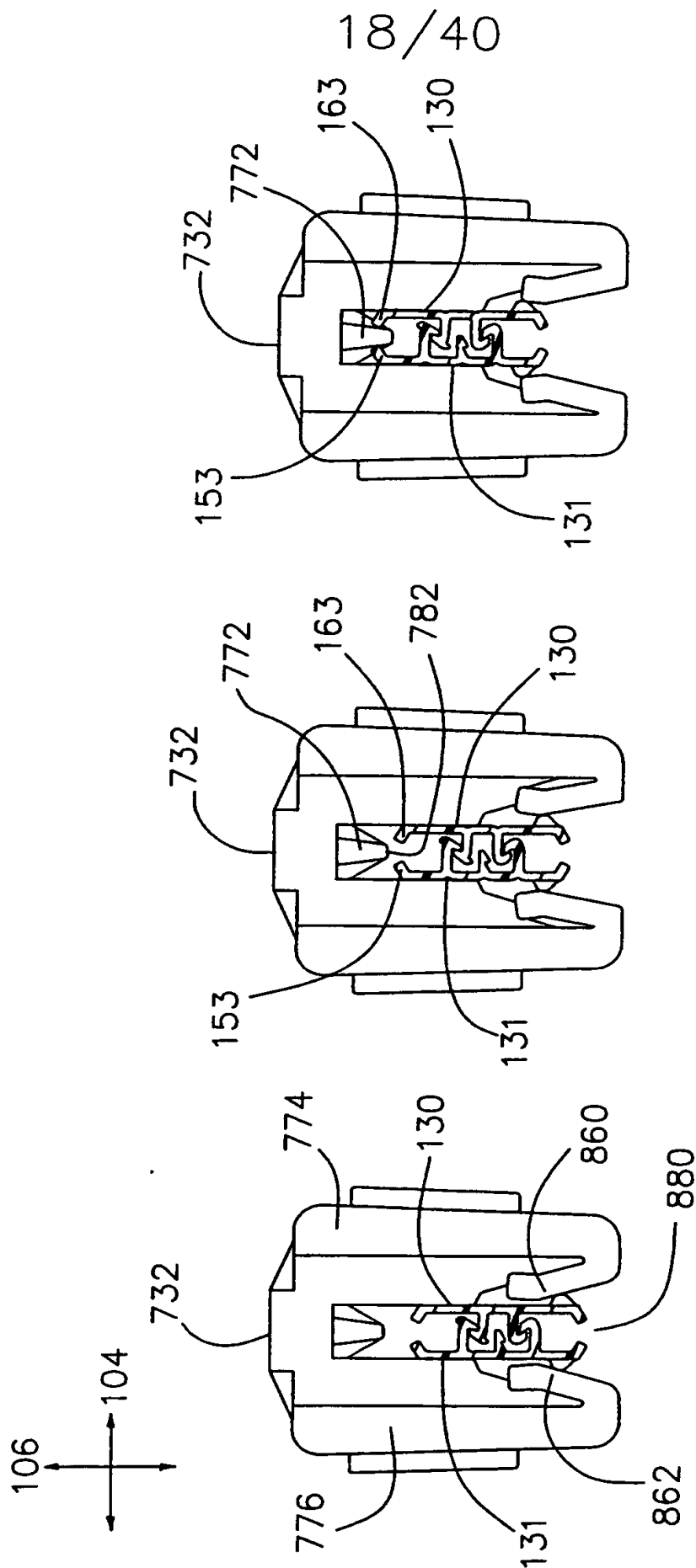


Fig. 37



19/40

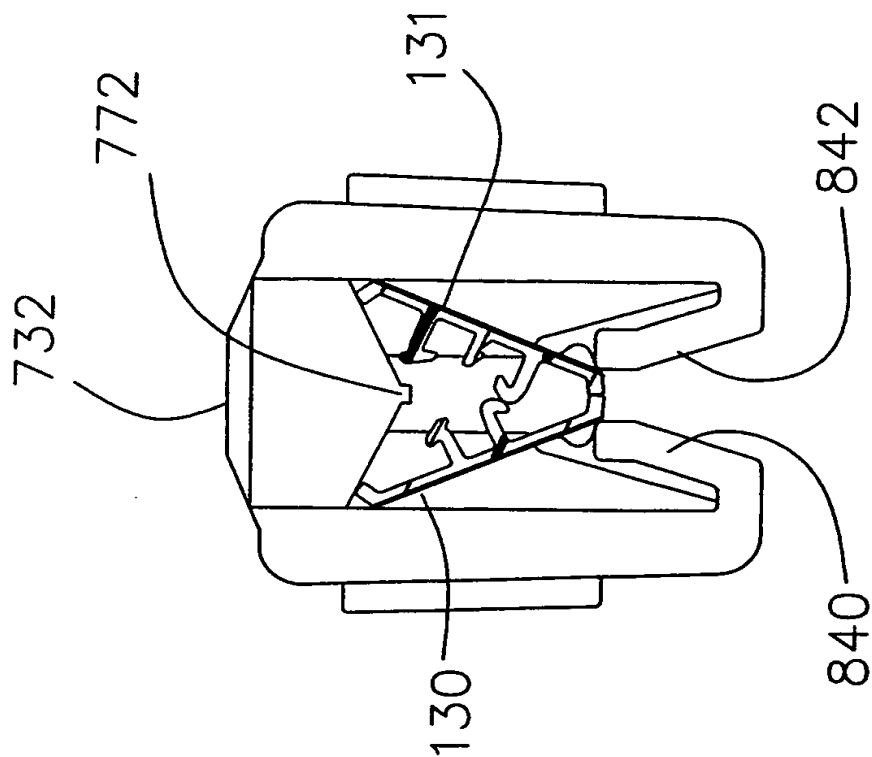


Fig. 42

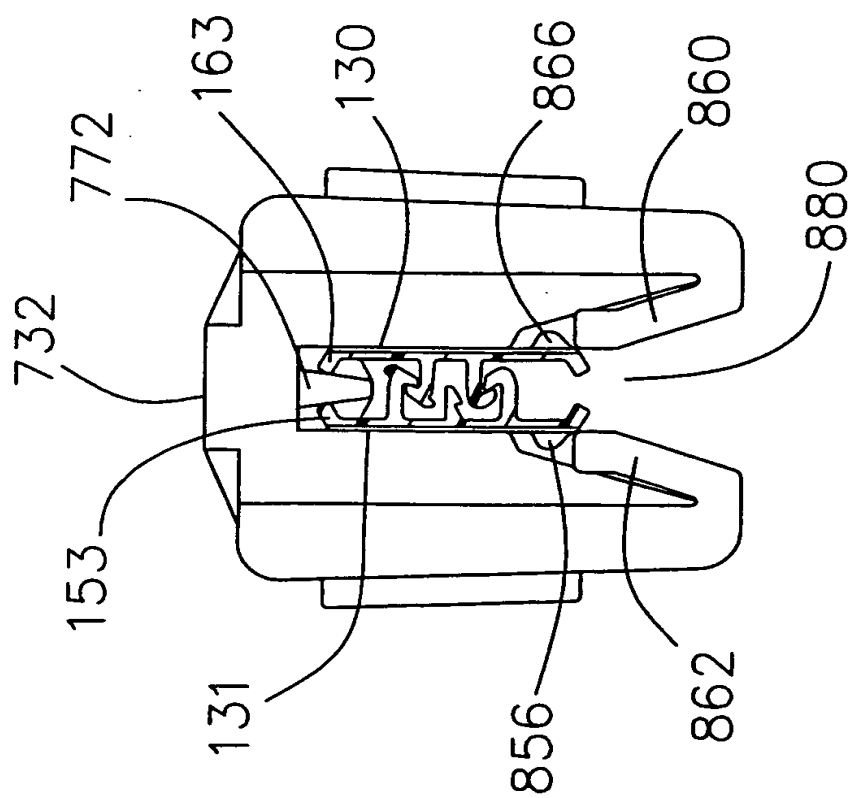


Fig. 41

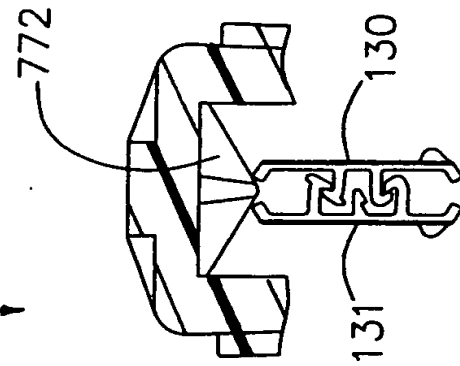
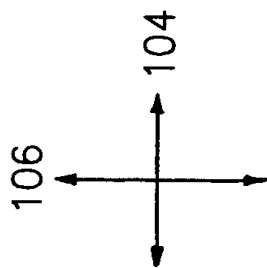


Fig. 43

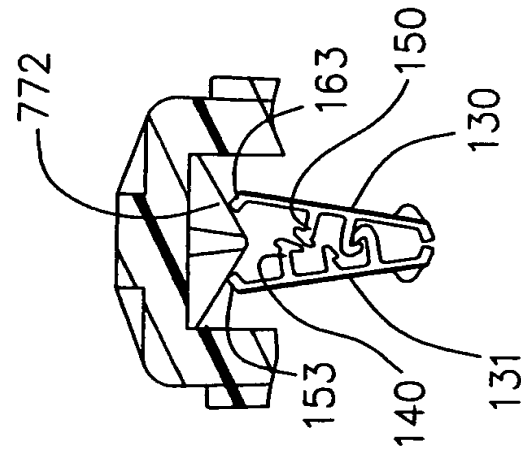


Fig. 44

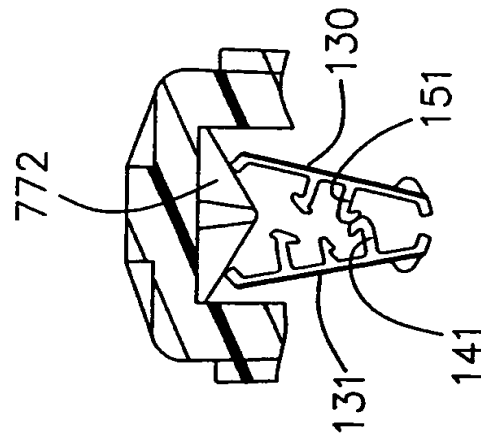


Fig. 45

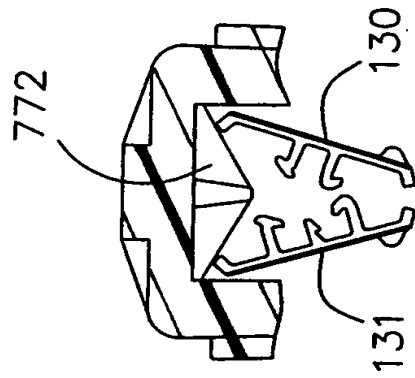
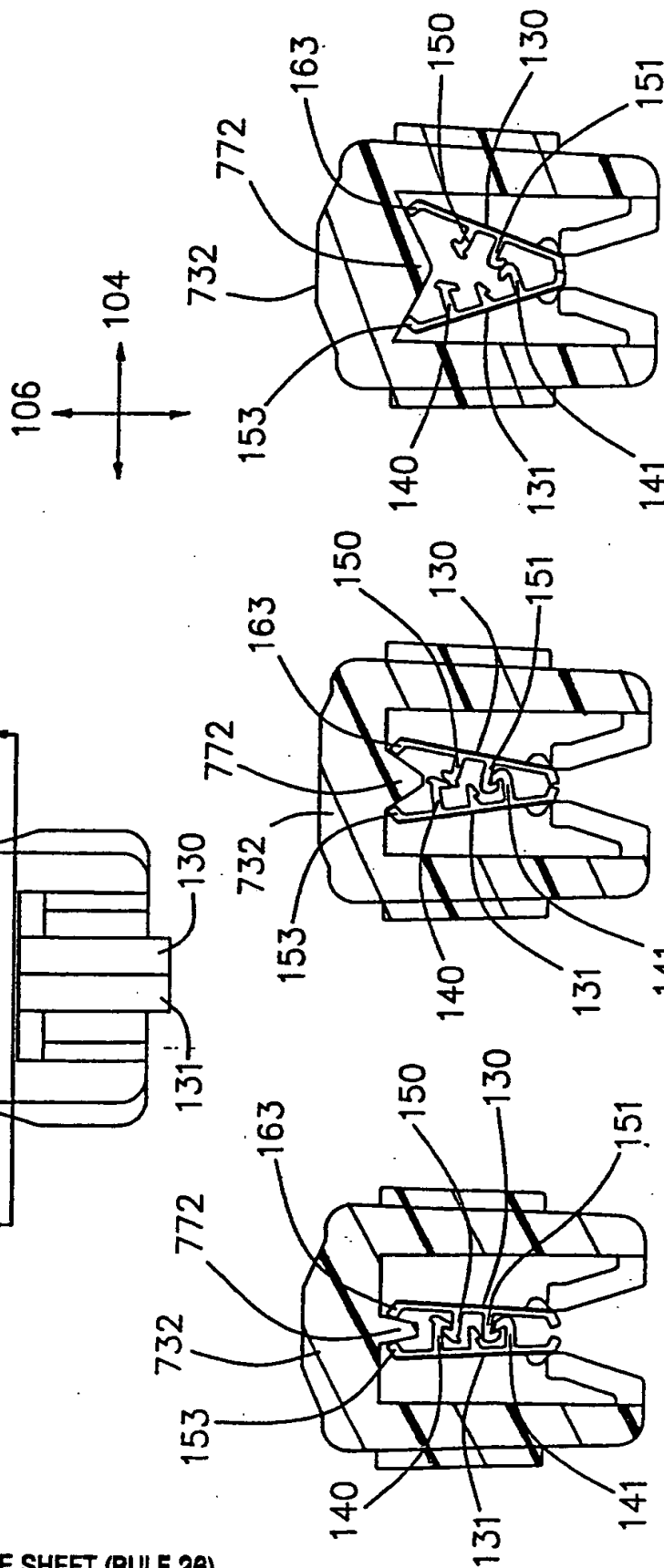
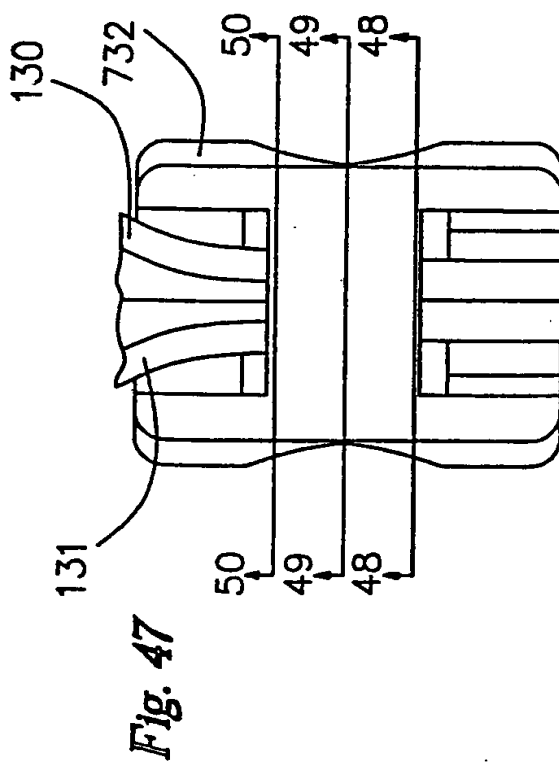
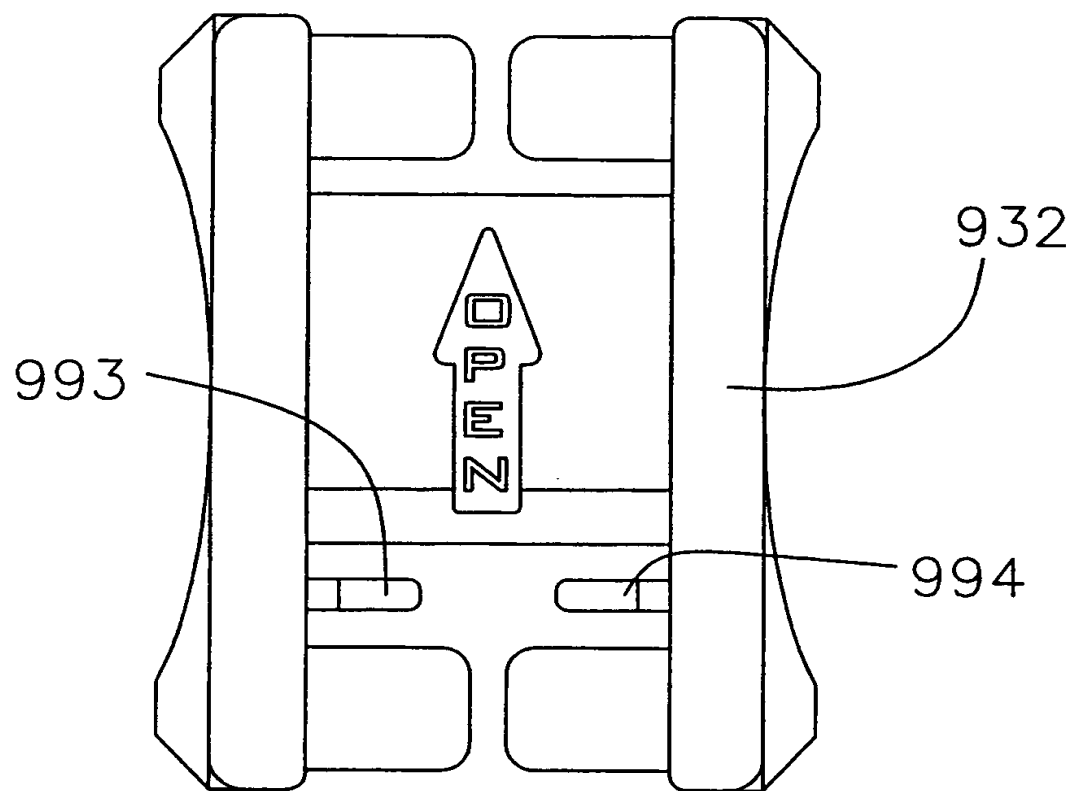


Fig. 46

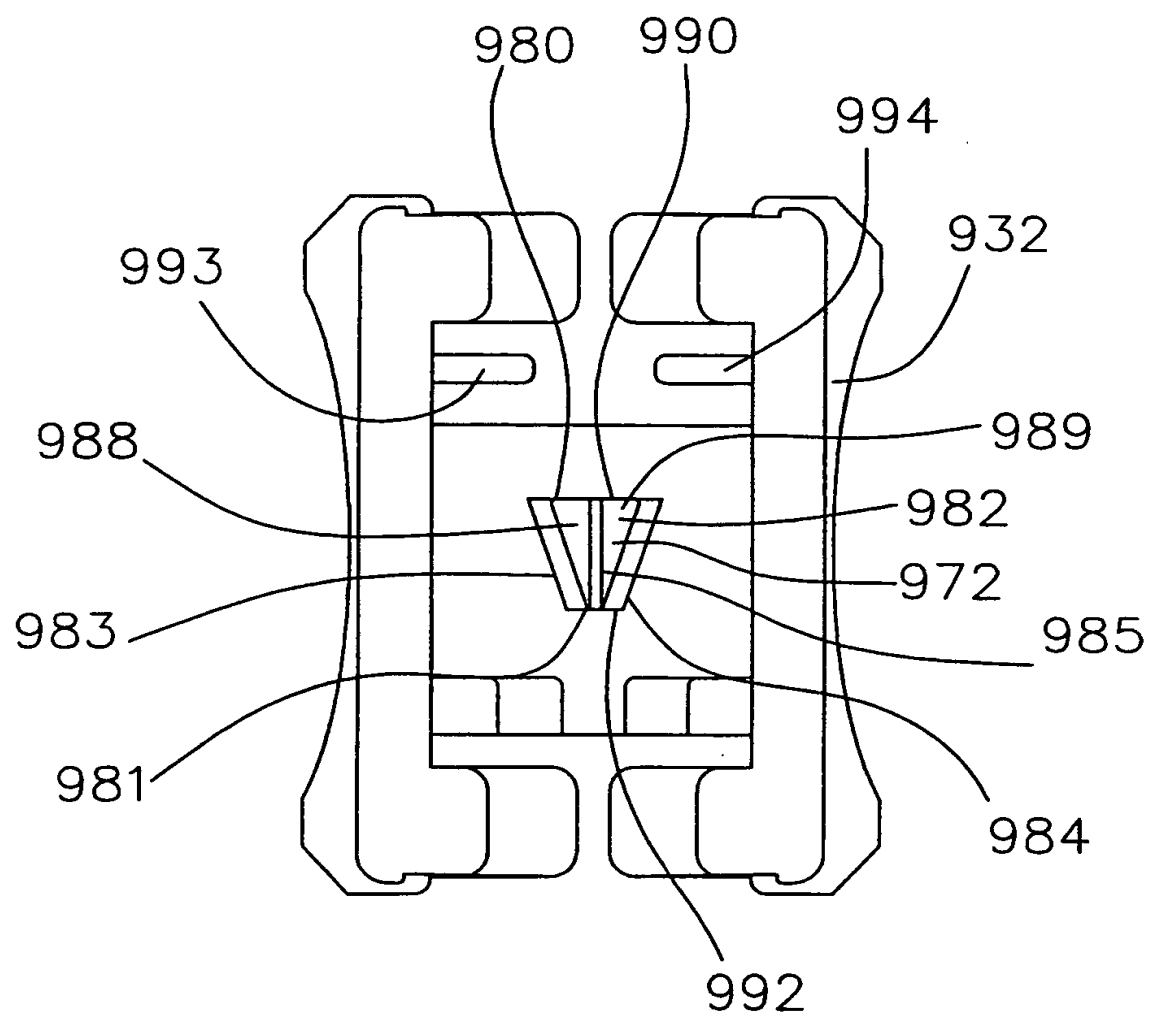
20/40



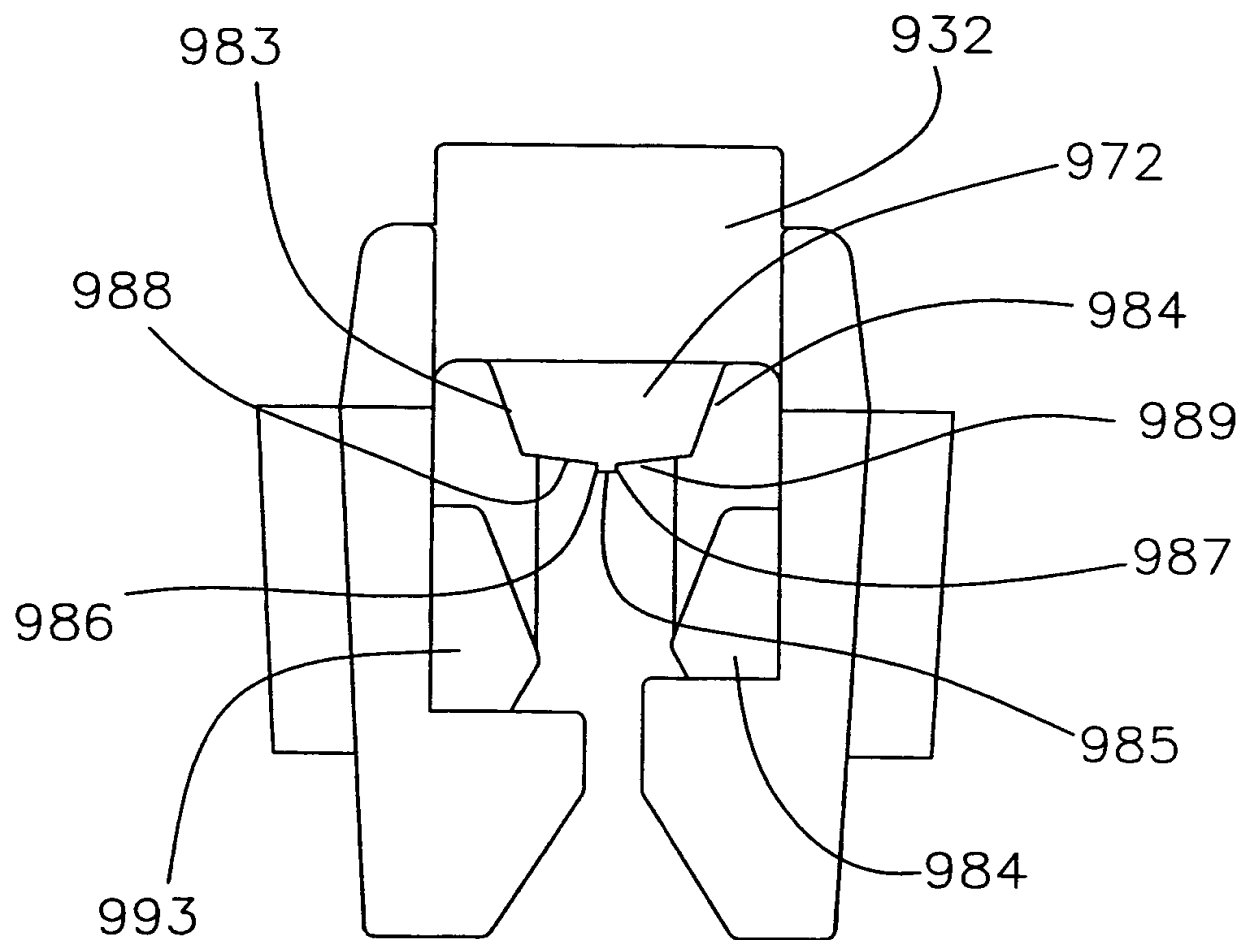
22/40

*Fig. 51*

23/40

*Fig. 52*

24/40

*Fig. 53*

25/40

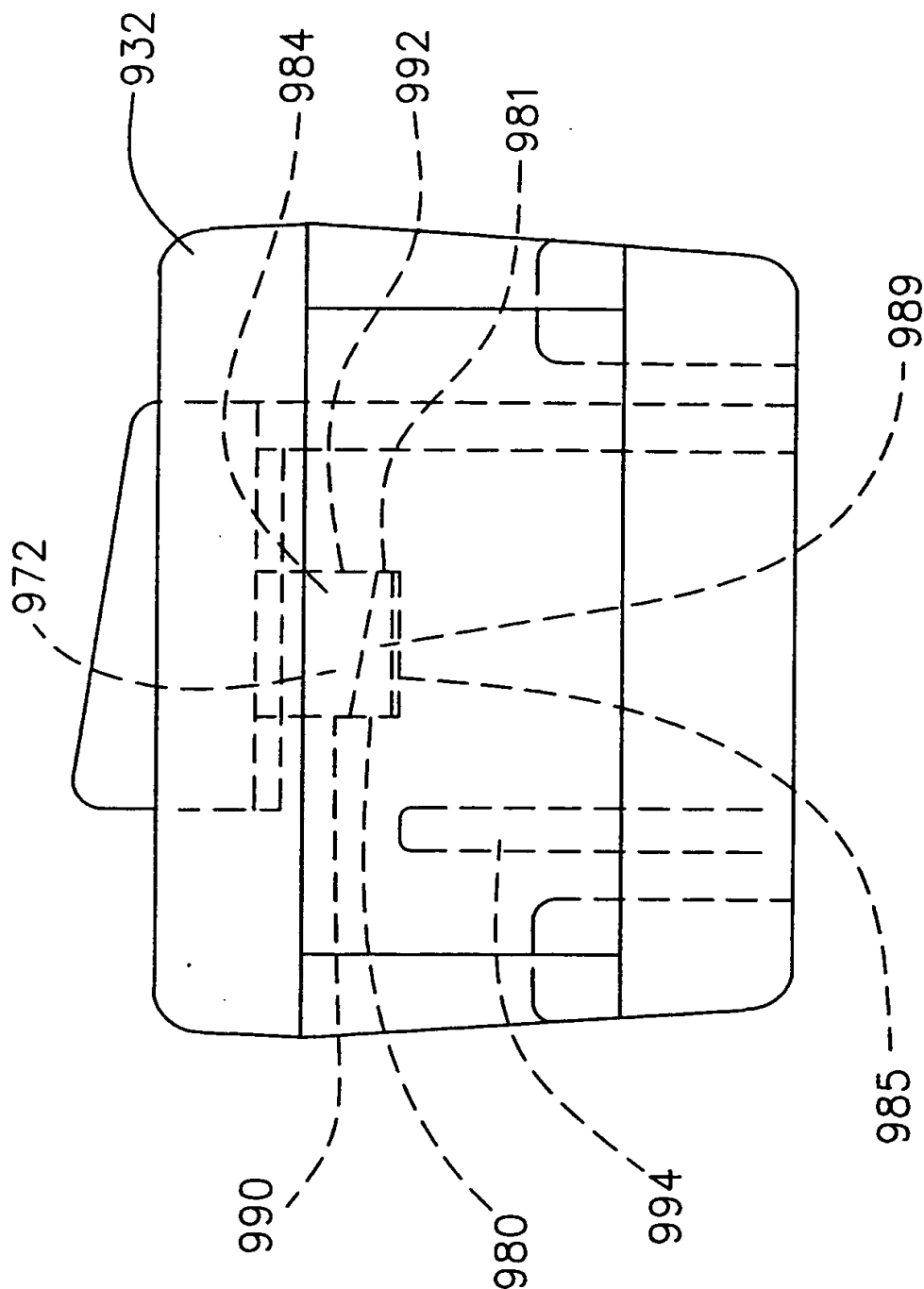
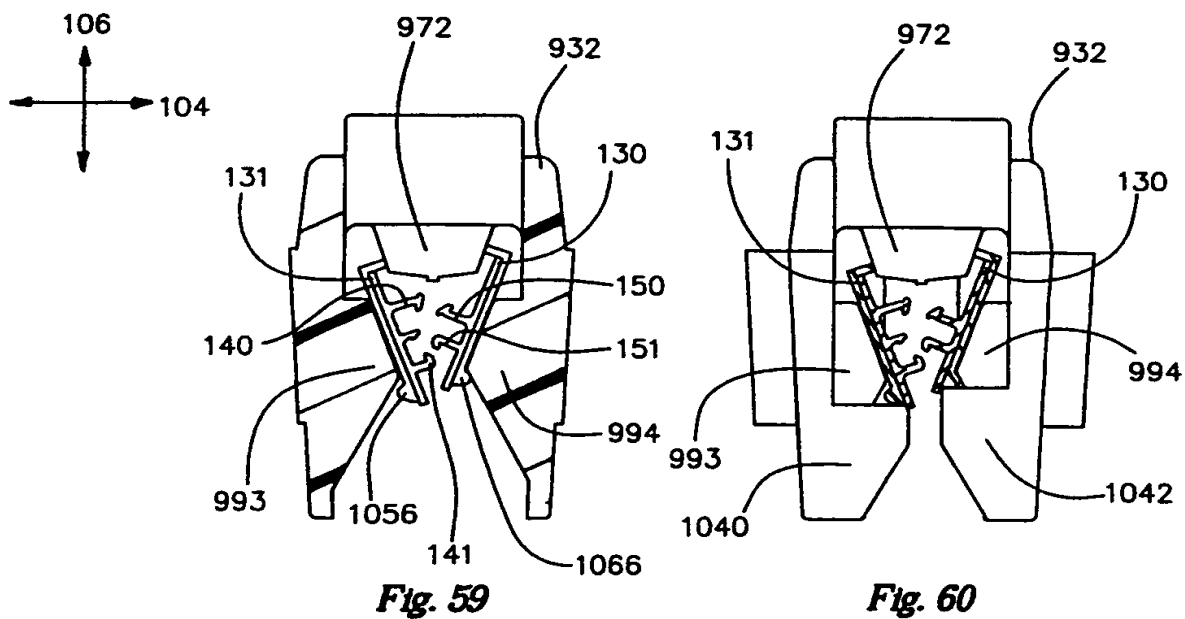
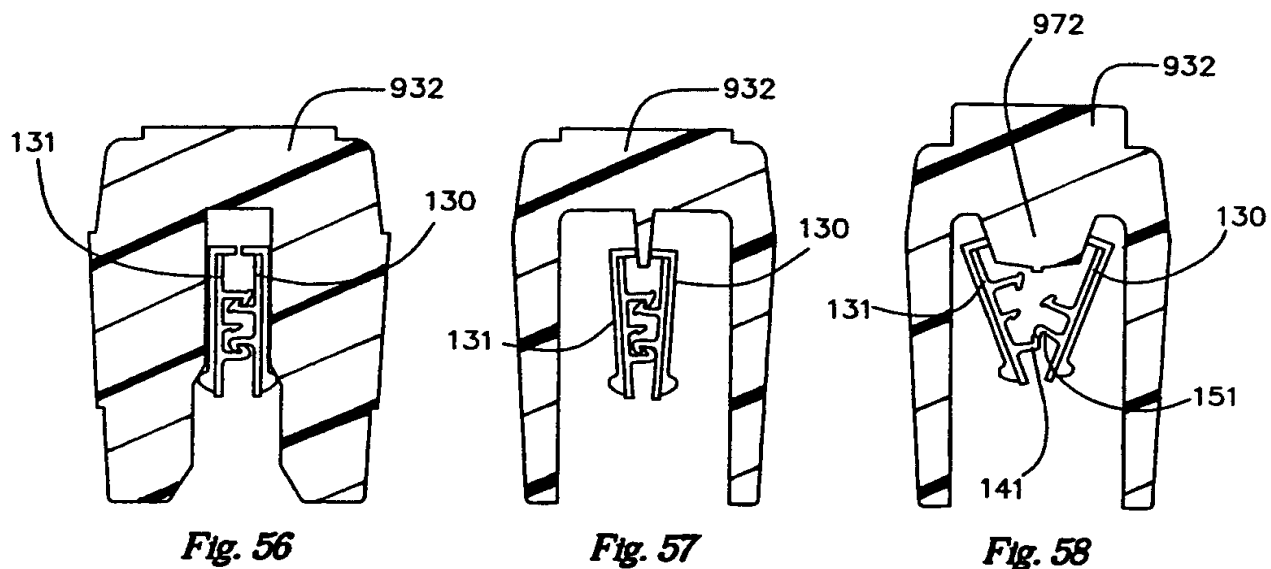
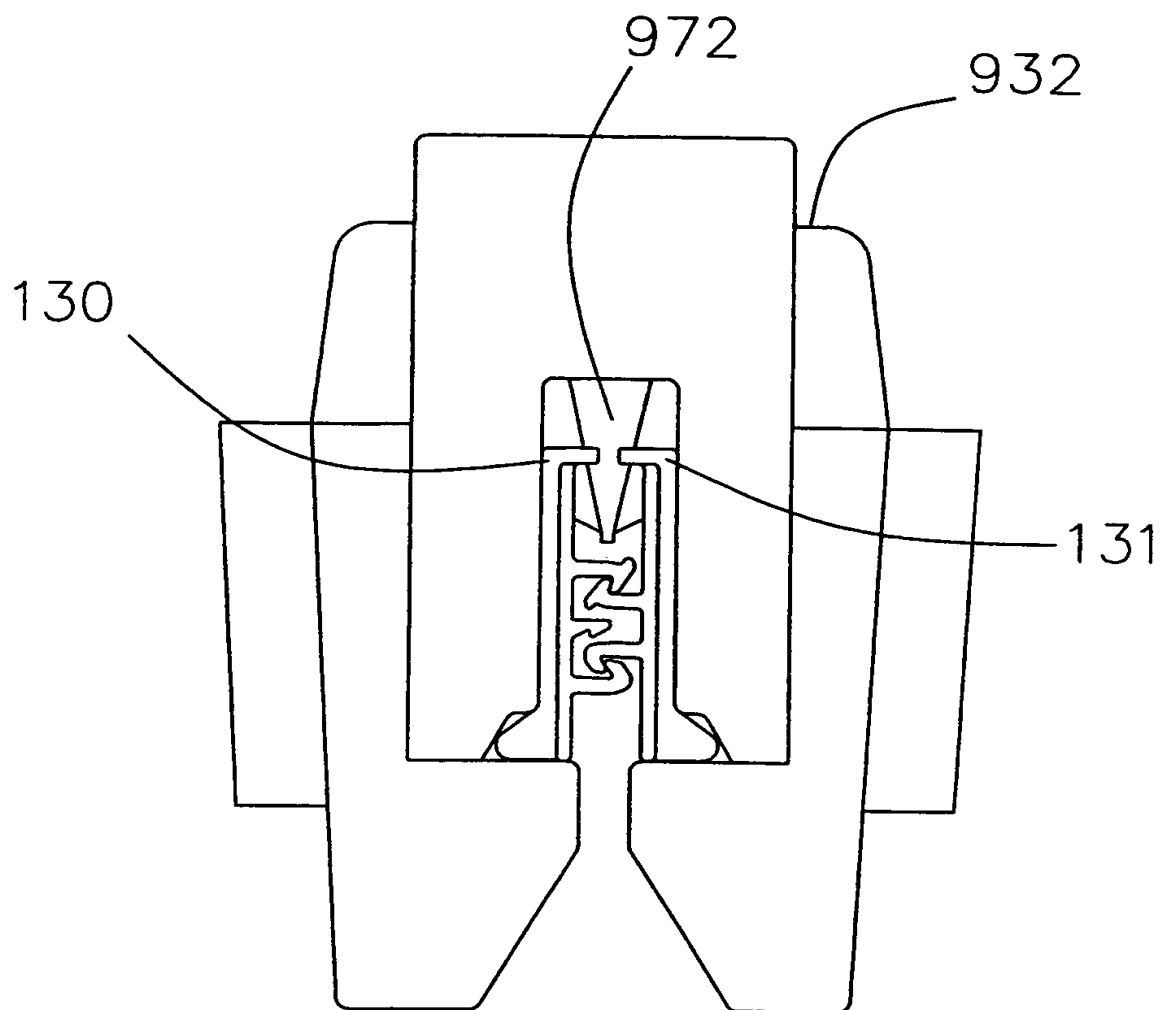


Fig. 54

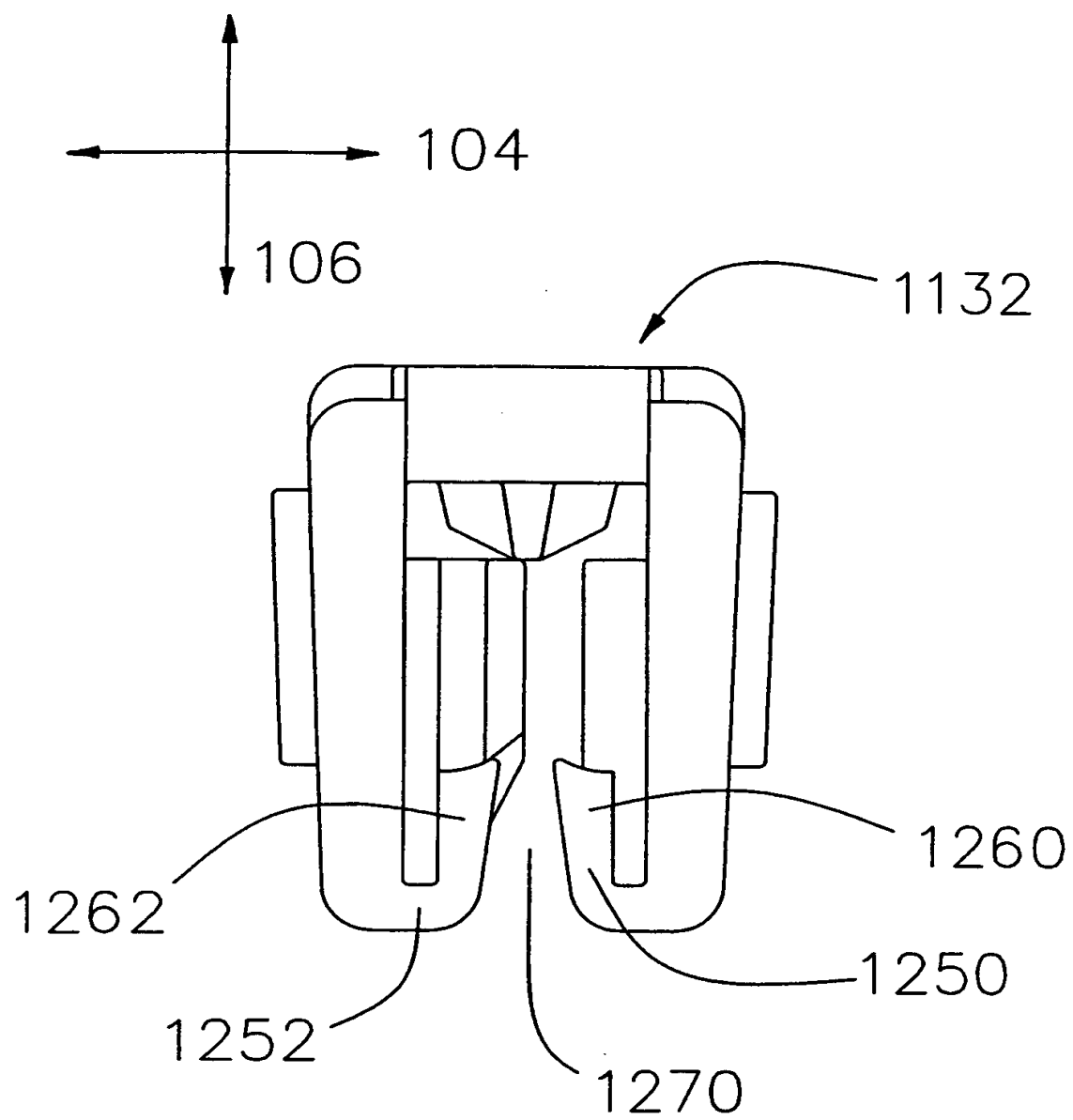
27/40



28/40

*Fig. 61*

29/40

*Fig. 62*

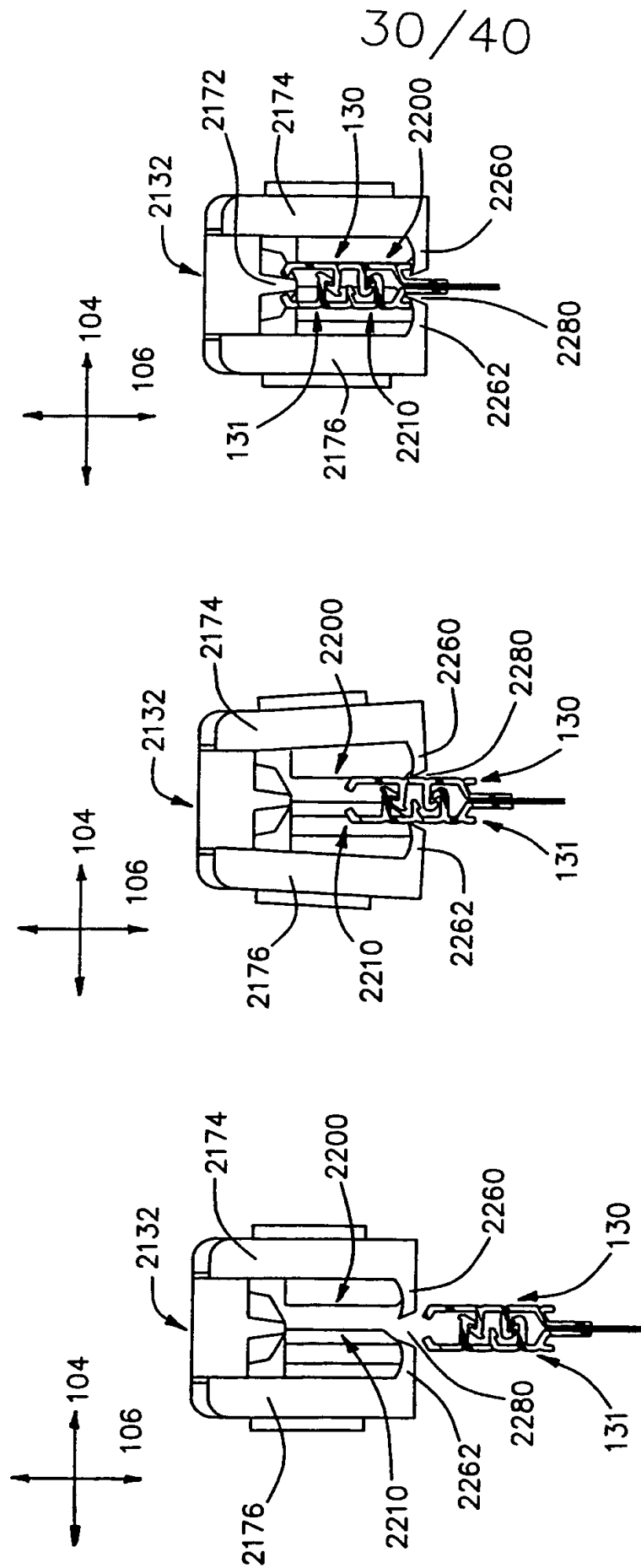


Fig. 63

Fig. 64

Fig. 65

31/40

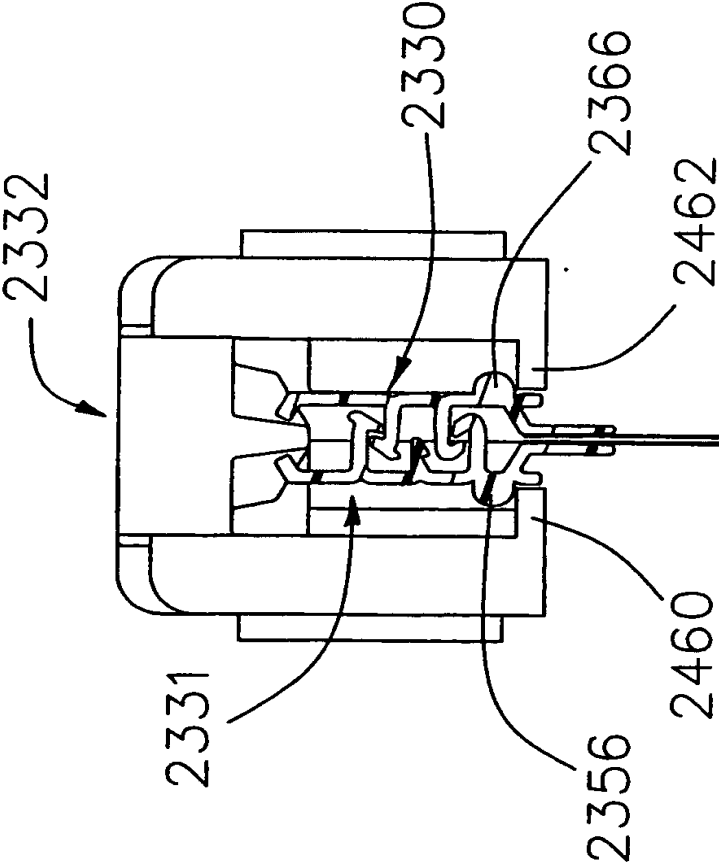
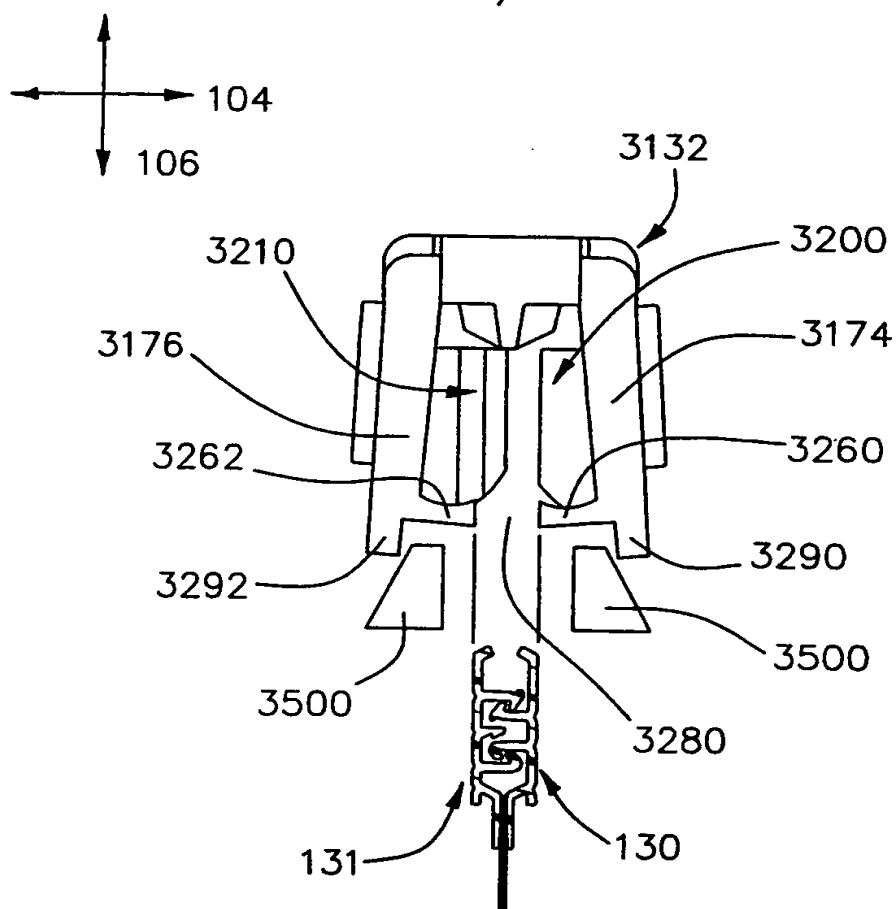
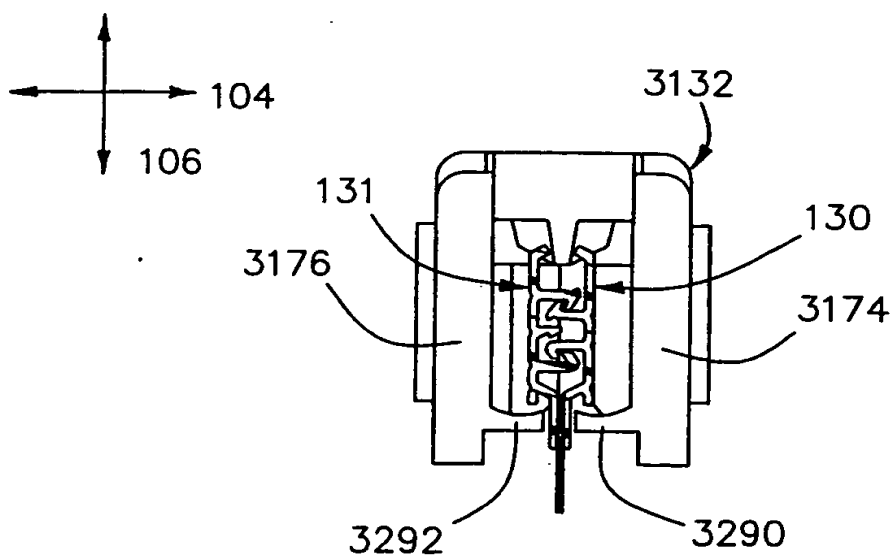
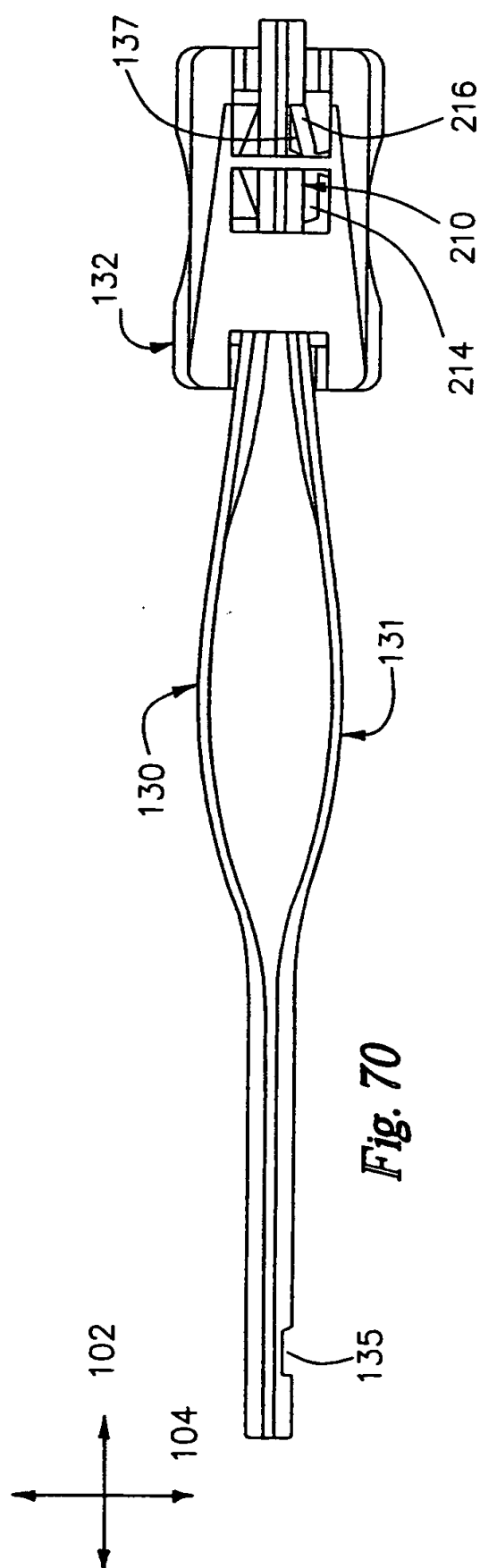
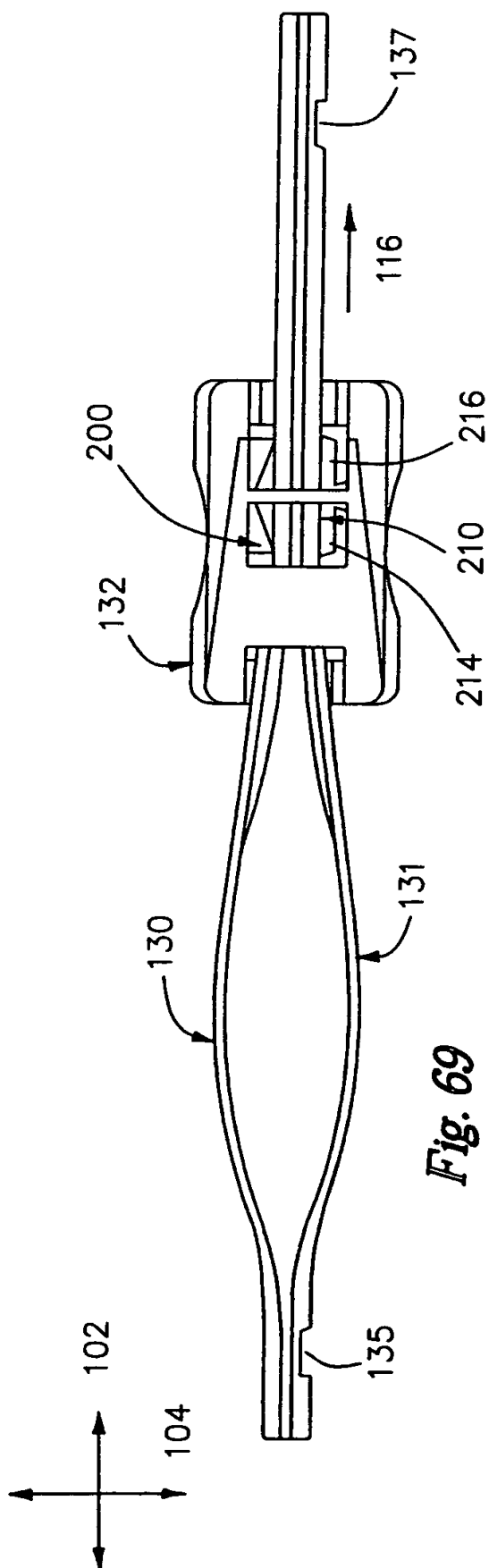


Fig. 66

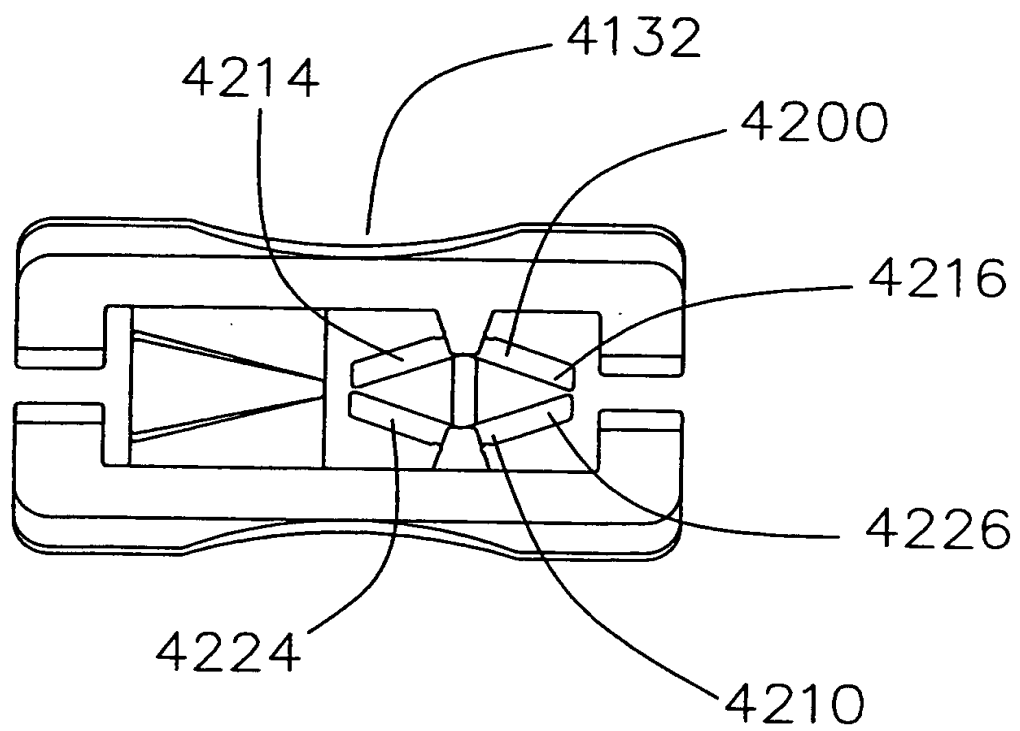
32/40

*Fig. 67**Fig. 68*

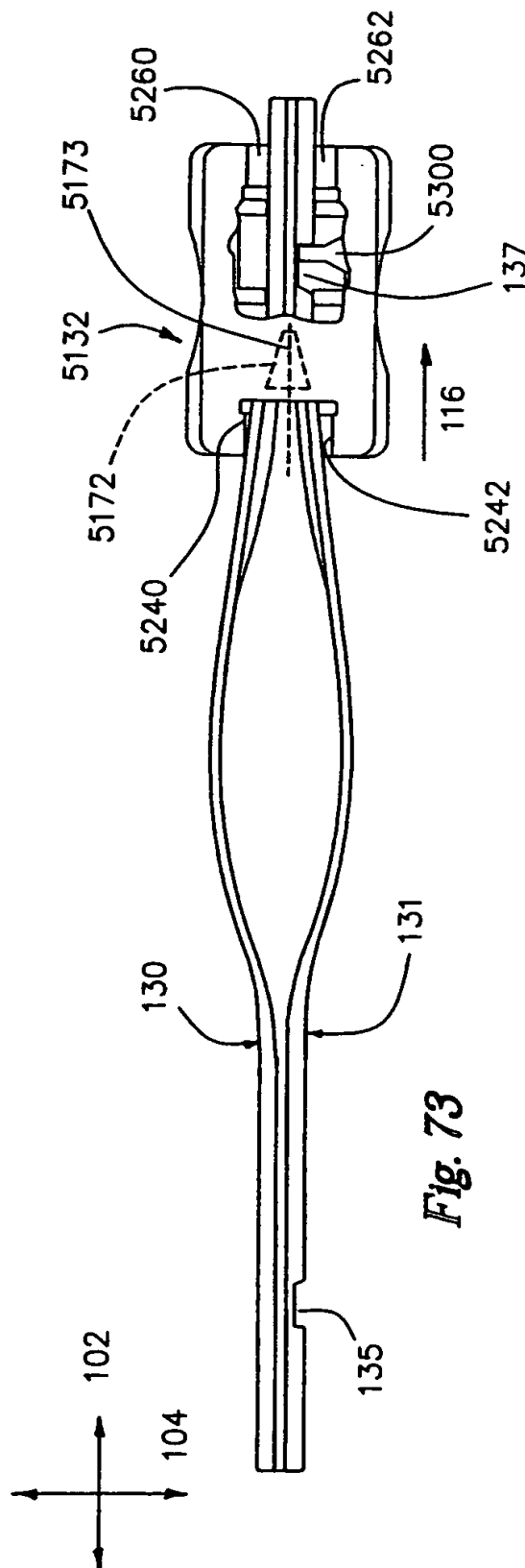
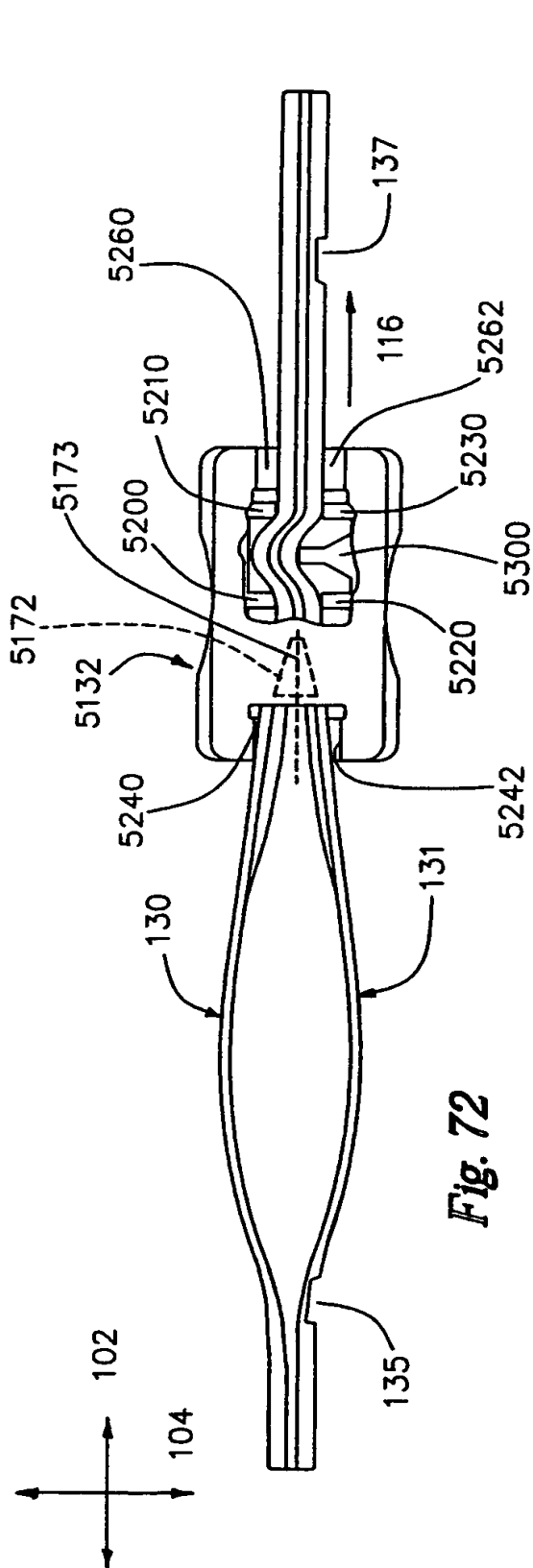
33/40



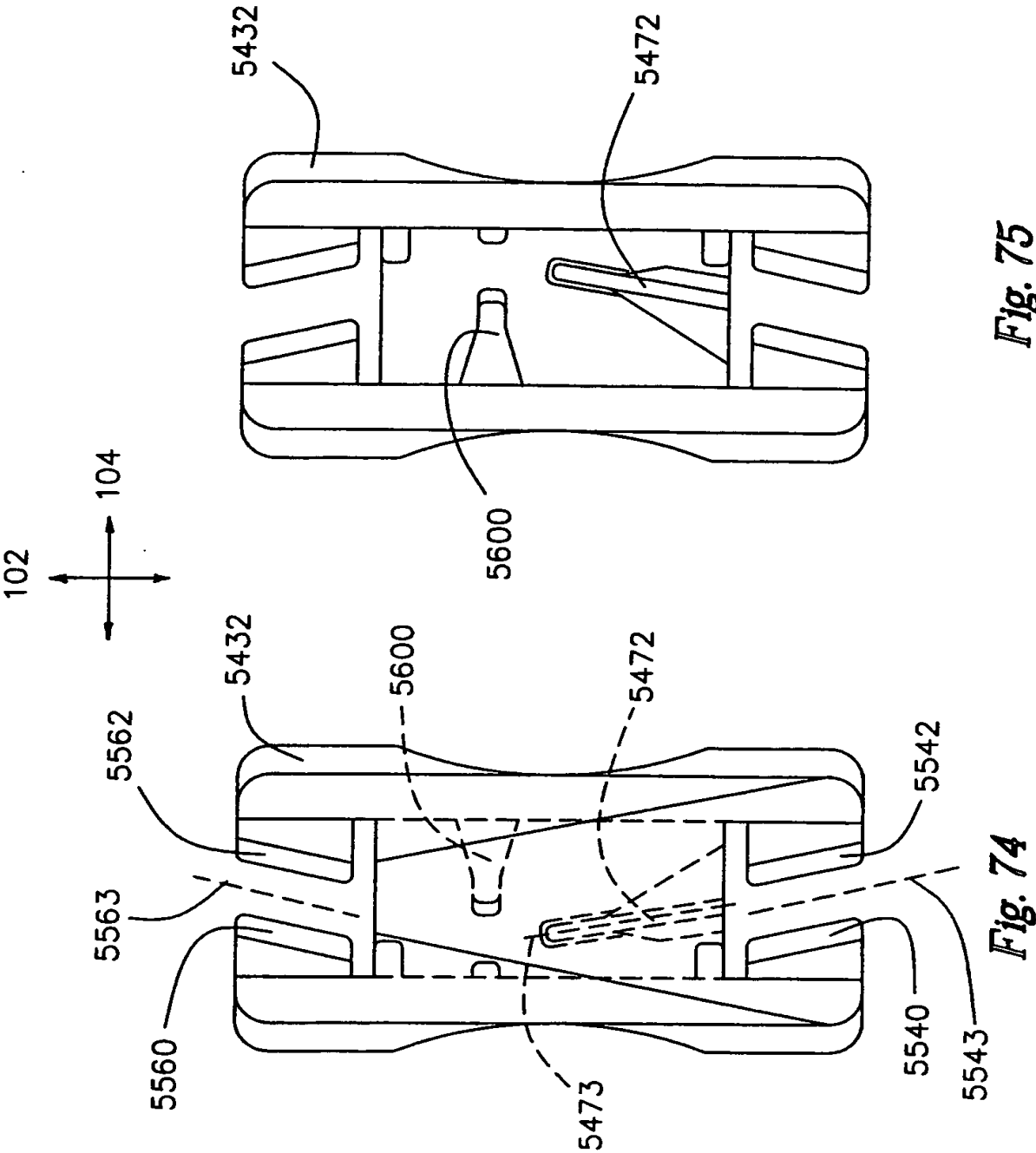
34/40

*Fig. 71*

35/40



36/40



37/40

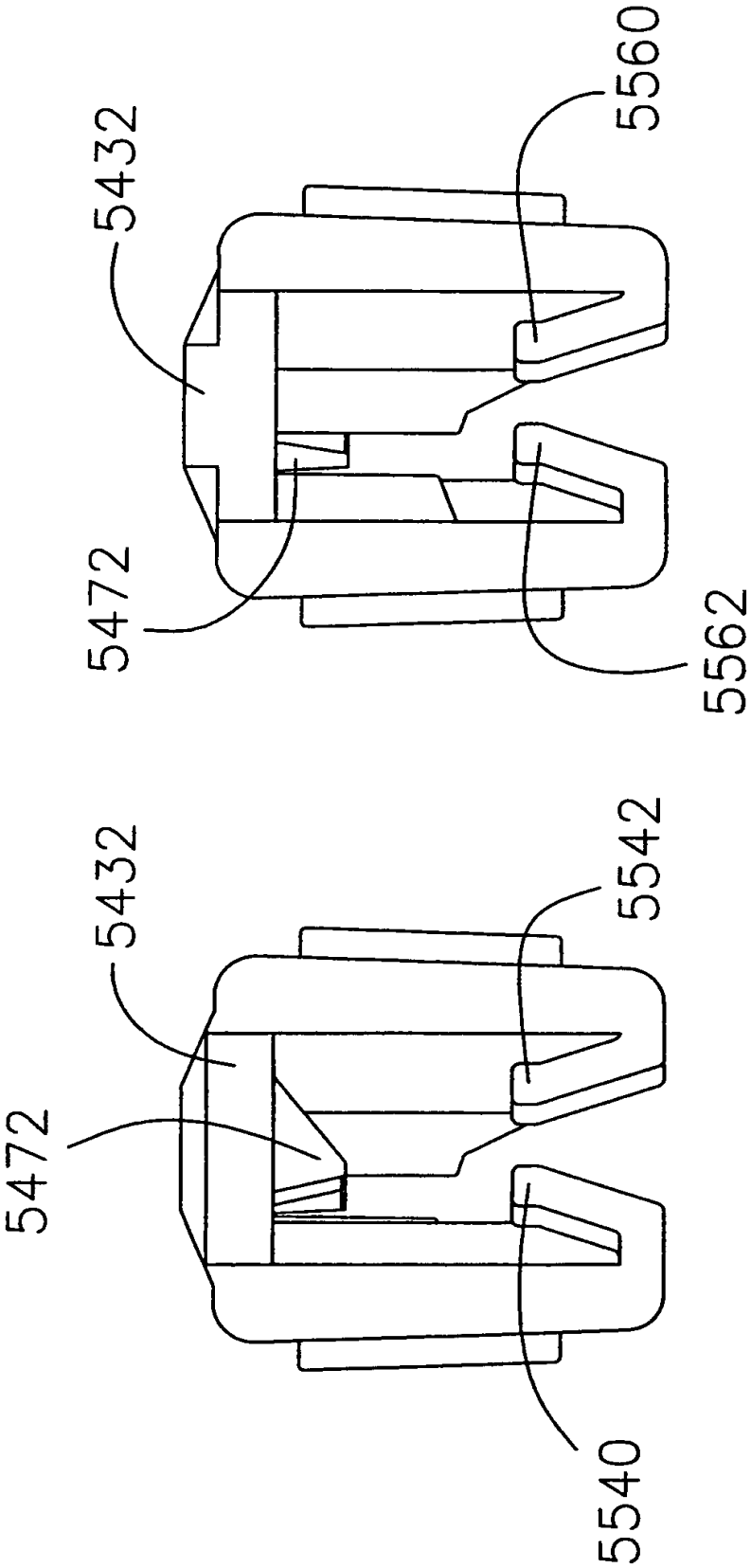


Fig. 77

Fig. 76

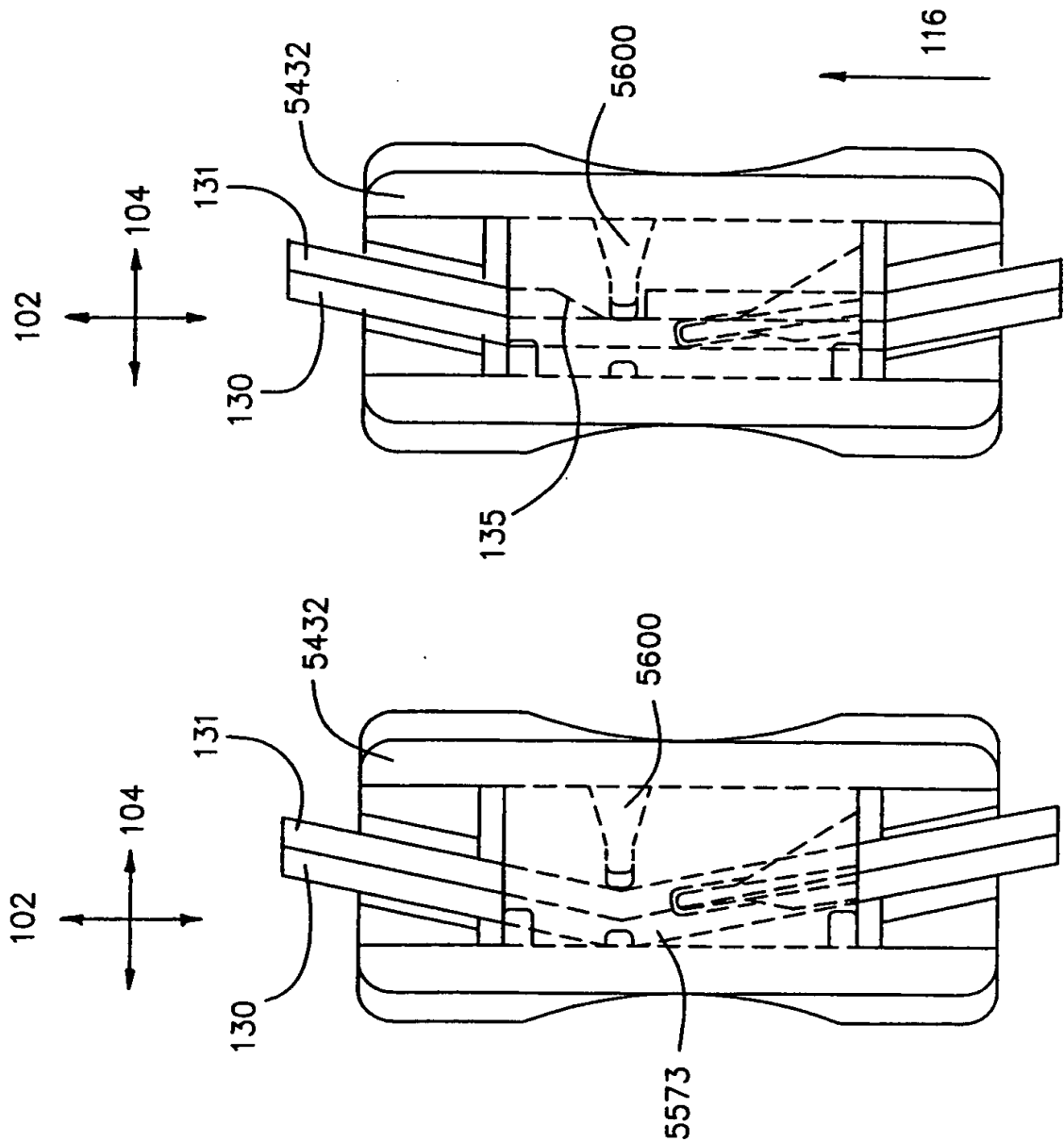


Fig. 79

Fig. 78

39/40

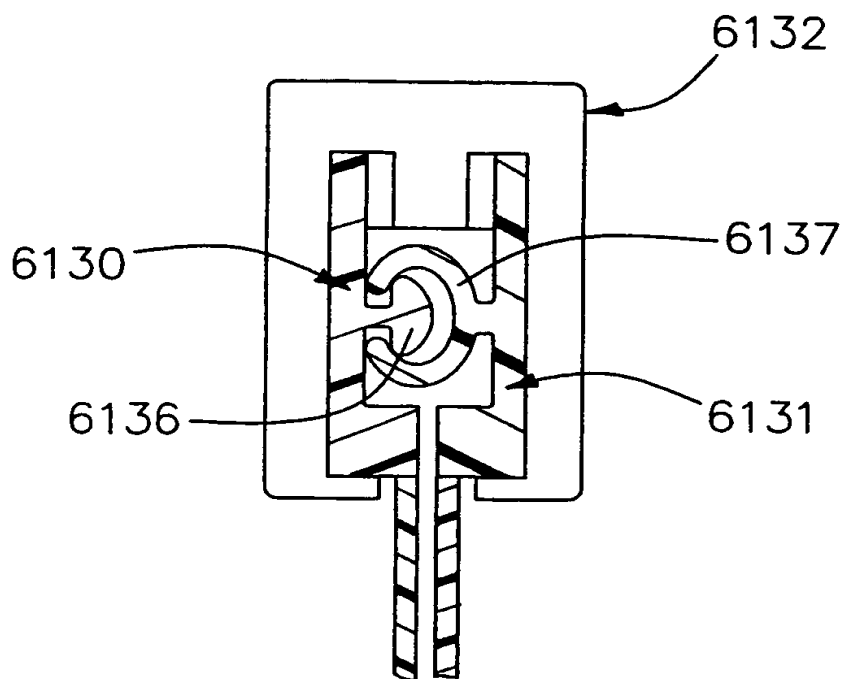


Fig. 80

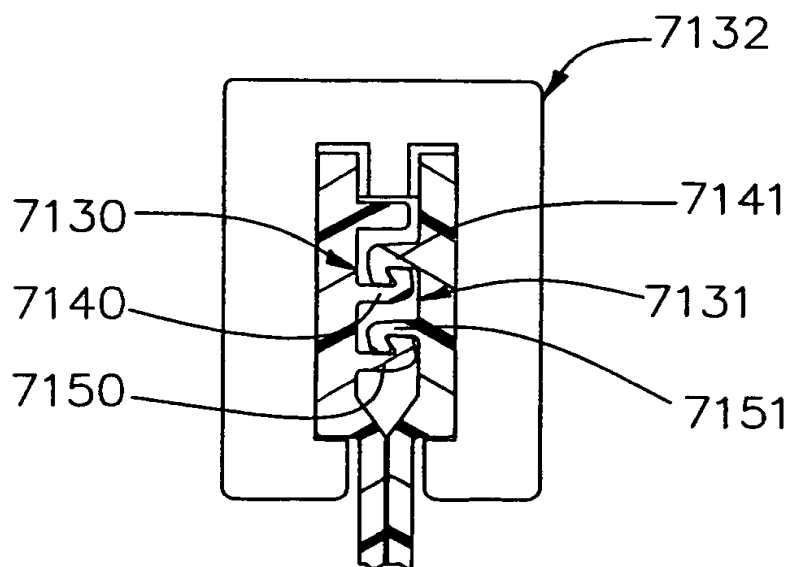


Fig. 81

40/40

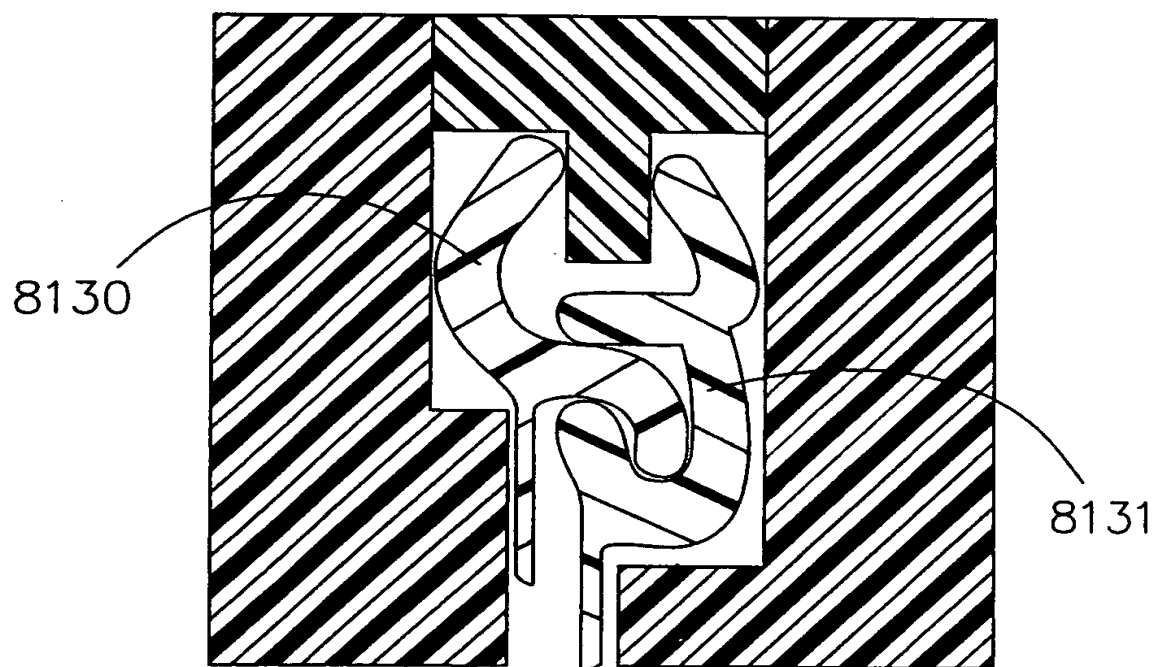


Fig. 82

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13288

A. CLASSIFICATION OF SUBJECT MATTER IPC(6) :A44B 19/16 US CL :24/30.5R According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 24/30.5R, 399, 400, 576, 587, 418, 435, 436; 383/63-66 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y --- A	US 5,301,394 A (RICHARDSON et al) 12 April 1994 (12/04/1994), see figures 1-3 in which the protrusions 21b, 22b catch the detent defined by the gap in the fastener strips to lock the slider in place.	1-4, 11-20, 22-27, 34-46, 53-62, 64-69 ----- 21, 63 ----- 5-10, 28-33, 47-52, 70, 71
Y	US 5,871,281 A (STOLMEIER et al) 16 February 1999 (16/02/1999), see figure 4 for the conventional arrow-head interengaging configuration.	21, 63
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* *A* *E* *L* *O* *P*	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier document published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	*T* *X* *Y* *A* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
Date of the actual completion of the international search 29 AUGUST 1999		Date of mailing of the international search report 07 OCT 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer <i>James R. Brittain</i> JAMES R. BRITTAI Telephone No. (703) 308-2168

PCT INTERNATIONAL APPLICATION TRANSMITTAL LETTER

DATE June 10, 1999

REGARDING THE INTERNATIONAL APPLICATION OF
THE GLAD PRODUCTS COMPANY et al.SHEET OR REFERENCE NUMBER
184725ENTITLED
CLOSURE DEVICE

Certification under 37 CFR 1.10 (if applicable)

EL190829428US

"Express Mail" mailing number

June 10, 1999

Date of Deposit

I hereby certify that this application is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Becky Williams

Typed or printed name of person making deposit

Becky Williams

Signature of person making deposit

To the United States Receiving Office (RO/US):

Accompanying this transmittal letter is the above-identified international application, including a completed Request Form (PCT/RO/101). Please process the application according to the provisions of the Patent Cooperation Treaty.

The following requests are made of the RO/US:

1. ☒ PREPARATION AND TRANSMITTAL OF CERTIFIED COPY OF PRIORITY DOCUMENTS -

Please prepare and transmit to the International Bureau a certified copy of the United States origin priority documents identified in Box VI of the Request form (37 CFR 1.451).

To cover the cost of copy preparation and certification (37 CFR 1.19(a)(3) and (b)(1)),

☒ a (check)(money order) in the amount of \$2,875.00 is attached to this transmittal letter.

☐ the RO/US is hereby authorized to charge the following deposit account no.: 12-1216.

The appropriate Search fee for the above-named Authority is indicated on the Fee Calculation Sheet (PCT/RO Annex).

2. ☒ SUPPLEMENTAL SEARCH FEES (ONLY WHEN ISA/US CONDUCTS THE INTERNATIONAL SEARCH.) - Please charge any Supplemental Search fees that may be required by the United States International Searching Authority (ISA/US) to deposit account no.: 12-1216

I understand that this authorization is subject to my oral confirmation thereof in each instance and that it in no way limits my right to submit a protest against payment of the Supplemental Search fees, but is merely an administrative aid to assure that the ISA/US may timely complete the Search Report.

NOTE: SUPPLEMENTAL SEARCH FEES FOR ISA/EP ARE PAYABLE DIRECTLY TO THE EUROPEAN PATENT OFFICE

3. ☒ DISCLOSURE INFORMATION - In order to assist in screening the accompanying International application for purposes of determining whether a license for foreign transmittal should and could be granted, the following information is supplied:

A. ☒ There is no prior filed application relating to this invention.

B. ☐ There is a prior application*, serial number filed which contains subject matter that is

1. ☐ substantially identical to that of the accompanying International application.

2. ☐ less than that of the accompanying International application. The additional subject matter of the International application appears on page , lines

3. ☐ more than that of the accompanying International application.

4. ☒ REQUEST FOR FOREIGN TRANSMITTAL LICENSE - According to the provisions of 35 U.S.C. 184 and 37 CFR 5.11, a license to transmit the accompanying International application to foreign agencies or international authorities is hereby requested.

*Priority is not claimed, unless all necessary information is listed in Box VI of the Request Form (PCT/RO/101).

SIGNER IS THE

☐

APPLICANT

☐

COMMON REPRESENTATIVE

☒

(ATTORNEY)(AGENT)

REG. NO. 33,589

NAME OF SIGNER (typed)

John M. Augustyn

John M. Augustyn

SIGNATURE

PCT REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.
International Filing Date
Name of receiving Office and "PCT International Application"
Applicant's or agent's file reference (if desired) (12 characters maximum) 184725

Box No. I TITLE OF INVENTION CLOSURE DEVICE	
Box No. II APPLICANT <div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <p><i>Name and Address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p> <p>THE GLAD PRODUCTS COMPANY 1221 Broadway Oakland, California 94612</p> </div> <div style="width: 30%;"> <p><input type="checkbox"/> This person is also inventor.</p> <p>Telephone No. (510) 271-7000</p> <p>Facsimile No. (510) 271-1652</p> <p>Teleprinter No.</p> </div> </div>	
State (that is, country) of nationality: US	State (that is, country) of residence: US
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S) <div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <p><i>Name and Address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p> <p>SAVICKI, Alan F., Sr. 577 Beaconsfield Avenue Naperville, Illinois 60565</p> </div> <div style="width: 30%;"> <p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)</p> </div> </div>	
State (that is, country) of nationality: US	State (that is, country) of residence: US
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
<p><i>Name and Address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i></p> <p>AUGUSTYN, John M. LEYDIG, VOIT & MAYER, LTD. Two Prudential Plaza, Suite 4900 180 North Stetson Chicago, Illinois 60601-6780 US</p>	<p>Telephone No. (312) 616-5600</p> <p>Facsimile No. (312) 616-5700</p> <p>Teleprinter No.</p>
<input type="checkbox"/> Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

Box No. V DESIGNATION OF STATE

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on the dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MK The Former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NZ New Zealand |
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| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
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| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |
| <input checked="" type="checkbox"/> LR Liberia | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become a party to the PCT after issuance of this sheet:

- ☒ South Africa
- ☐
- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Supplemental Box

If the Supplemental Box is not used, this sheet need not be included in the request.

1. If, in any of the boxes, the space is insufficient to furnish all the information: in such case write "Continuation of Box No. ..." (indicate the number of the Box) and furnish the information in the same manner as required according to the provisions of the Box in which the space was insufficient, in particular:

- (i) if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
- (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
- (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
- (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
- (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or, in, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
- (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
- (vii) if, in Box No. VI, the earlier application is an APIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed.

2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

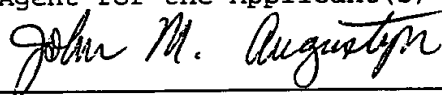
Continuation of Box No. IV:

SHEPPARD, Berton Scott
MUSKAL, James B.
SCHLEMMER, Dennis R.
COONS, Gordon R.
ROSENQUIST, John E.
KOZAK, John W.
OSLAKOVIC, Charles S.
PHELPS, Mark E.
HARTMANN, H. Michael
GAGALA, Bruce M.
MOTTIER, Charles H.
KILYK, John, Jr.
GREEN, Robert F.
CONKLIN, John B.
ZALEWA, James D.
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WYAND, Jeffrey A.
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BAYS, Gregory C.

LARCHER, Carol
MILLER, Thomas A.
SKLAR, Steven H.
HUNT, Gregory A.
HEFNER, M. Daniel
MATTHIAS, Brent E.
JEWIK, Patrick R.
BELUSH, Thomas A.
JAROSIK, Gary R.
OSTROFF, Joseph S.
MAKEEVER, Jeffery J.
HASAN, Salim A.
SCHODIN, David J.
AHERN, Paul L.
ANDERSON, Theodore W.
SMITH, Noel I.

all of
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180 North Stetson
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US
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(312) 616-5700 Fax

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office for which for the purposes of the present international application is the receiving Office) identified above as item(s): _____				
<i>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</i>				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / US		Request to use results of earlier search; reference to that search (if an earlier search has been carried out or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office)		
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 42 claims : 11 abstract : 1 drawings : 40 sequence listing part of description : _____ total number of sheets: 98		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganisms or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
Figure of the drawings which should accompany the abstract:		Language of filing of the international application: English		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request). <div style="text-align: center;"> LEYDIG, VOIT & MAYER, LTD. Agent for the Applicant(s)  By: _____ John M. Augustyn </div>				

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority specified by applicant: ISA /	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

PCT

FEE CALCULATION SHEET

For receiving Office use only

Annex to the Request

International Application No.

Applicant's or agent's
file reference

184725

Date stamp of the receiving Office

Applicant

THE GLAD PRODUCTS COMPANY et al.

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE

\$240.00 T

2. SEARCH FEE

\$450.00 S

International Search to be carried out by ISA/US

(If two or more international Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 98 sheets.

first 30 sheets \$455.00 b₁

68 x \$10.00 = \$680.00 b₂

remaining sheets additional amount

Add amounts entered at b₁ and b₂ and enter total at B \$1,135.00 B

Designation Fees

The international application contains 78 designations.

10 x \$105.00 = \$1,050.00 D

number of designation fees amount of designation fee payable (maximum 11)

Add amounts at B and D and enter total amount at I \$2,185.00 I

(Applicants from certain states are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT 0 P

5. TOTAL FEES PAYABLE

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

\$2,875.00

TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☐ authorization to charge
deposit account (see below)

☐ bank draft

☐ coupons

☒ cheque

☐ cash

☐ other (specify):

☐ postal money order

☐ revenue stamps

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ US

☐ is hereby authorized to charge the total fees indicated above to my deposit account.

☒ is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

12-1216

Deposit Account Number

10/06/1999
Date (day/month/year)

John M. Augustyn
Signature

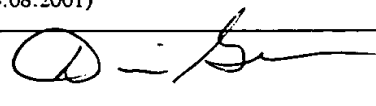
PATENT COOPERATION TREATY

PCT

REC'D 09 OCT 2001

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 184725	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/13288	International filing date (day/month/year) 10 June 1999 (10.06.1999)	Priority date (day/month/year) NONE
International Patent Classification (IPC) or national classification and IPC IPC(7): A44B 19/16 and US Cl.: 24/462		
Applicant THE GLAD PRODUCTS COMPANY		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>0</u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 07 December 2000 (07.12.2000)	Date of completion of this report 24 August 2001 (24.08.2001)	
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer  James R. Brittain Telephone No. 703-308-1113	

Form PCT/IPEA/409 (cover sheet)(July 1998)

I. Basis of the report1. With regard to the **elements** of the international application:*☒ the international application as originally filed.☒ the description:pages 1-42 as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____☒ the claims:pages 43-53 as originally filedpages NONE, as amended (together with any statement) under Article 19pages NONE, filed with the demandpages NONE, filed with the letter of _____☒ the drawings:pages 1-40 as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____☐ the sequence listing part of the description:pages NONE as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☐ The amendments have resulted in the cancellation of:☐ the description, pages NONE☐ the claims, Nos. NONE☐ the drawings, sheets/fig NONE5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims <u>5-10,21,28-33,47-52,63,70,71</u>	YES
	Claims <u>1-4,11-20,22-27,34-46,53-62,64-69</u>	NO
Inventive Step (IS)	Claims <u>5-10,28-33,47-52,70,71</u>	YES
	Claims <u>1-4,11-21,22-27,34-46,53-63,64-69</u>	NO
Industrial Applicability (IA)	Claims <u>1-71</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-4, 11-20, 22-27, 34-46, 53-62, and 64-69 lack novelty under PCT Article 33(2) as being anticipated by Richardson et al. (US 5,301,394). The fastener structure of Richardson et al. (figures 1-3) includes protrusions 21b, 22b upon the slider which catch the detent defined by the edges forming the gap in the fastener strips so as to lock the slider in place.

Claims 21 and 63 lack an inventive step under PCT Article 33(3) as being obvious over Richardson et al. (US 5,301,394) in view of Stolmeier et al. (US 5,871,281). The fastener structure of Richardson et al. (figures 1-3) includes protrusions 21b, 22b upon the slider which catch the detent defined by the edges forming the gap in the fastener strips so as to lock the slider in place. The difference is that it doesn't use traditional arrow-head interengaging elements. It would have been obvious to use traditional arrow-head interengaging elements in view of Stolmeier et al. (figure 4) which teaches that such a fastener provides a good securement of the interengaging elements.

Claims 5-10, 28-33, 47-52, 70 and 71 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest the housing of the slider having a void opposite the protrusion to allow the fastening strips to deflect or a second detent at the second end of the fastening strips, the slider engageable via the protrusion with the second detent to prevent removal from the second end of the fastening strips.

PATENT COOPERATION TREATY

RECEIVED
OCT 13 1999
PCT
LEYDIG, VOIT & MAYER

JMA

From the INTERNATIONAL SEARCHING AUTHORITY

To: JOHN M. AUGUSTYN
LEYDIG, VOIT & MAYER, LTD.
TWO PRUDENTIAL PLAZA, SUITE 4900
180 NORTH STETSON
CHICAGO IL 60601-6780

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 184725	Date of Mailing (day/month/year) 07 OCT 1999
International application No. PCT/US99/13288	International filing date (day/month/year) 10 JUNE 1999
Applicant THE GLAD PRODUCTS COMPANY	

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.
- Filing of amendments and statement under Article 19:**
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):
- When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.
- Where?** Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35
- For more detailed instructions, see the notes on the accompanying sheet.

RECEIVED
DOCKETING

DATE: 10-13-99

BY: RJS

12-7-99

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
4. **Further action(s):** The applicant is reminded of the following:
- Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 *bis* 1 and 90 *bis* 3, respectively, before the completion of the technical preparations for international publication.
- Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).
- Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

REMINDED

Name and mailing address of the ISA/IS
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231
Facsimile No. (703) 305-3230

Authorized officer
[Signature]
JAMES R. BRITTAIN

Telephone No. (703) 308-2168

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 184725	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5
International application No. PCT/US99/13288	International filing date (day/month/year) 10 JUNE 1999	(Earliest) Priority Date (day/month/year) NONE
Applicant THE GLAD PRODUCTS COMPANY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).

2. ☐ Unity of invention is lacking (See Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐

filed with the international application.

☐

furnished by the applicant separately from the international application.

☐

but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐

transcribed by this Authority.

4. With regard to the title.

☒

the text is approved as submitted by the applicant.

☐

the text has been established by this Authority to read as follows:

5. With regard to the abstract.

☒

the text is approved as submitted by the applicant.

☐

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. 72

☐

as suggested by the applicant.

☒

because the applicant failed to suggest a figure.

☐

because this figure better characterizes the invention.

☐

None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/13288

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A44B 19/16

US CL : 24/30.5R

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 24/30.5R, 399, 400, 576, 587, 418, 435, 436; 383/63-66

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y --- A	US 5,301,394 A (RICHARDSON et al) 12 April 1994 (12/04/1994), see figures 1-3 in which the protrusions 21b, 22b catch the detent defined by the gap in the fastener strips to lock the slider in place.	1-4, 11-20, 22-27, 34-46, 53-62, 64-69 ----- 21, 63 ----- 5-10, 28-33, 47-52, 70, 71
Y	US 5,871,281 A (STOLMEIER et al) 16 February 1999 (16/02/1999), see figure 4 for the conventional arrow-head interengaging configuration.	21, 63



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

29 AUGUST 1999

Date of mailing of the international search report

07 OCT 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

JAMES R. BRITTAIN

Telephone No. (703) 308-2168